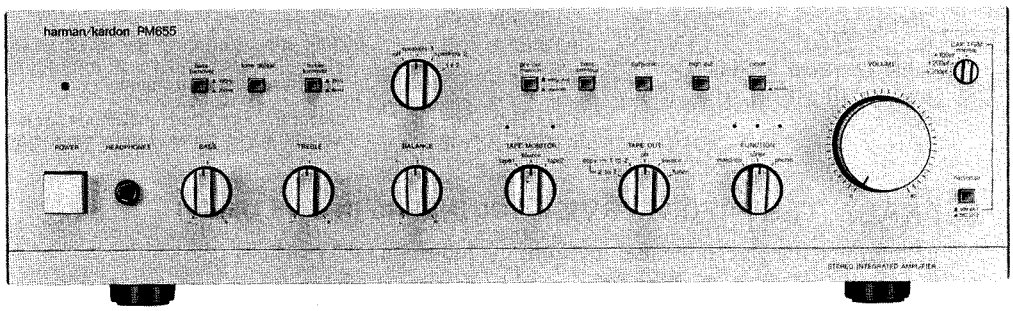
The Harman Kardon
Model PM655

Manual No. 80A

STEREO INTEGRATED AMPLIFIER

Technical Manual



PM655

harman/kardon
240 Crossways Park West, Woodbury,
New York 11797
1112-H15280A4 P-088410 Printed in Japan

SPECIFICATIONS

	Nominal	Limit
RMS Output Power		
8Ω, 1kHz, THD 0.08%	67W	≧ 60W
4Ω, 1kHz, THD 1.0%	112W	≧ 100W
High Instantaneous Current Capability (HCC)	45A	
Half Power Bandwith	10Hz ~ 100kHz	
Frequency Response at −3dB	0.15Hz ~ 180kHz	
Input Sensitivity		
Video/CD, Tuner	135mV ± 25mV	
Phono (MM)	2.2mV ± 0.2mV*	
Phono (MC)	120μV ± 0.2μV *	
Signal to Noise Ratio		
Video/CD, Tuner	79.5dB	≧ 78dB
Phono (MM)	79.5dB	≧ 77dB
Phono (MC)	77dB	≧ 74dB
Channel Separation at 10kHz		
Video/CD, Tuner	50dB	≧ 45dB
Phono (MM)	56dB	≧ 45dB
Phono (MC)	50dB	≧ 45dB
IM Distortion Ratio	0.06%	≦ 0.1%
Damping Factor at 1kHz	66	≧ 50
Tone Control Characteristics		
Bass Turnover Frequency	200Hz/400Hz	
Bass at 50Hz		
Boost	10dB ± 2dB	
Cut	−10dB ± 2dB	
Treble Turnover Frequency	2kHz/6kHz	
Treble at 10kHz		
Boost	10dB ± 2dB	
Cut	−10dB ± 2dB	

	Nominal	Limit
Filters		
Subsonic	15Hz, 6dB/Octave	
High Cut	6kHz, 6dB/Octave	
Bass Contour		
Boost at 50Hz	+10dB	
DC Output Voltage		
L channel	0mV ± 60mV	
R channel	0mV ± 60mV	
RIAA Equalization at Tape Out (20Hz/20kHz) (No load)	0.2dB	≦ 0.5dB/0.2dB ≦ 0
Phono Overload (No load)		
Phono (MM)	220mV	≧ 190mV
Phono (MC)	13mV	≧ 8mV
Dimensions (W x H x D)	17-1/2"x5-5/16"x15-11 (443 x 134 x 398 mm)	
Weight	22 lbs.11 oz. (10.3 kg)	
Power Supplies		
U.S.A. and Canada models	AC 120V, 60Hz	
General and German models	AC 220/240V, 50/60Hz	
Power Consumption		
U.S.A. and Canada models	400W (440VA)	
General and German models	290W	

* Input Sensitivity (Phono MM and MC) for German model are 2.4mV ± 0.2mV (MM) and 145μV ± 20μV (MC).

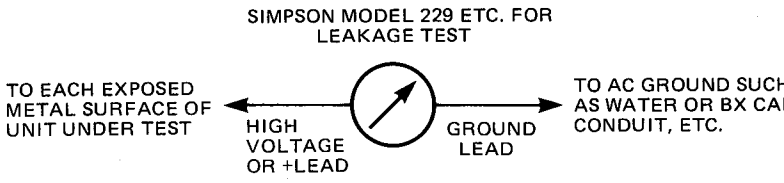
This specification is the target of servicing. But, there is a case that the specification is not applicable to the measurement condition and instrument.

Specifications and components subject to change without notice. Overall performance will be maintained or improved.

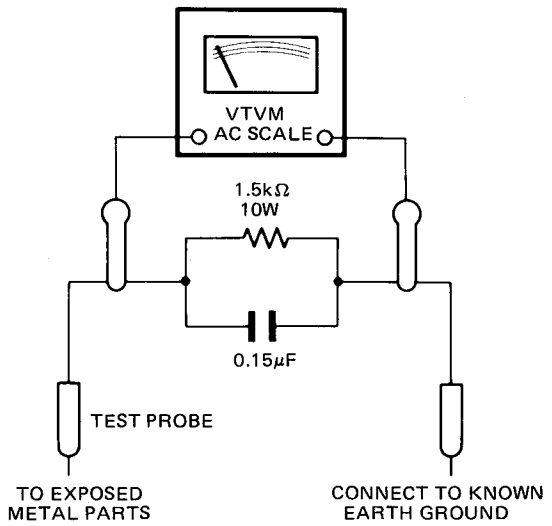
LEAKAGE TEST (FOR SERVICE ENGINEERS IN THE U.S.A.)

Before returning the unit to the user, perform the following safety checks:

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the unit.
2. Be sure that any protective devices such as nonmetallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc. which were removed for servicing are properly reinstalled.


SIMPSON MODEL 229 ETC. FOR LEAKAGE TEST
TO EACH EXPOSED METAL SURFACE OF UNIT UNDER TEST
HIGH VOLTAGE OR +LEAD
GROUND LEAD
TO AC GROUND SUCH AS WATER OR BX CA CONDUIT, ETC.

3. Be sure that no shock hazard exists; check for leakage current using Simpson Model 229 Leakage Tester, standard equipment item No. 21641, RCA Model WT540A or use alternate method as follows:
   Plug the power cord directly into a 120-volt AC receptacle (do not use an Isolation Transformer for this test). Using two clip leads, connect a 1500 Ohm, 10-watt resistor paralleled by a 0.15μF capacitor, in series with all exposed metal cabinet parts and a known earth ground, such as a water pipe or conduit. Use a VTVM or VOM with 1000 Ohms per volt, or higher, sensitivity to measure the AC voltage drop across the resistor. (See Diagram.) Move the resistor connection to each exposed metal part having a return path to the chassis (antenna, metal, cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. (This test should be performed with the power switch in both the On and Off positions.)



A reading of 0.35 volt RMS or more is excessive and indicates a potential shock hazard which must be corrected bef returning the unit to the owner.

ALIGNMENT PROCEDURES (REFER TO PAGES 11 AND 12)

■ **Conditions:**
- Set the Function selector to the "video/CD" position.
- Set the Volume control to minimum.
- Set the Speaker selector to "off" position.
- Make the adjustment at a room temperature of 77°F (25°C).

■ DC BALANCE ADJUSTMENT

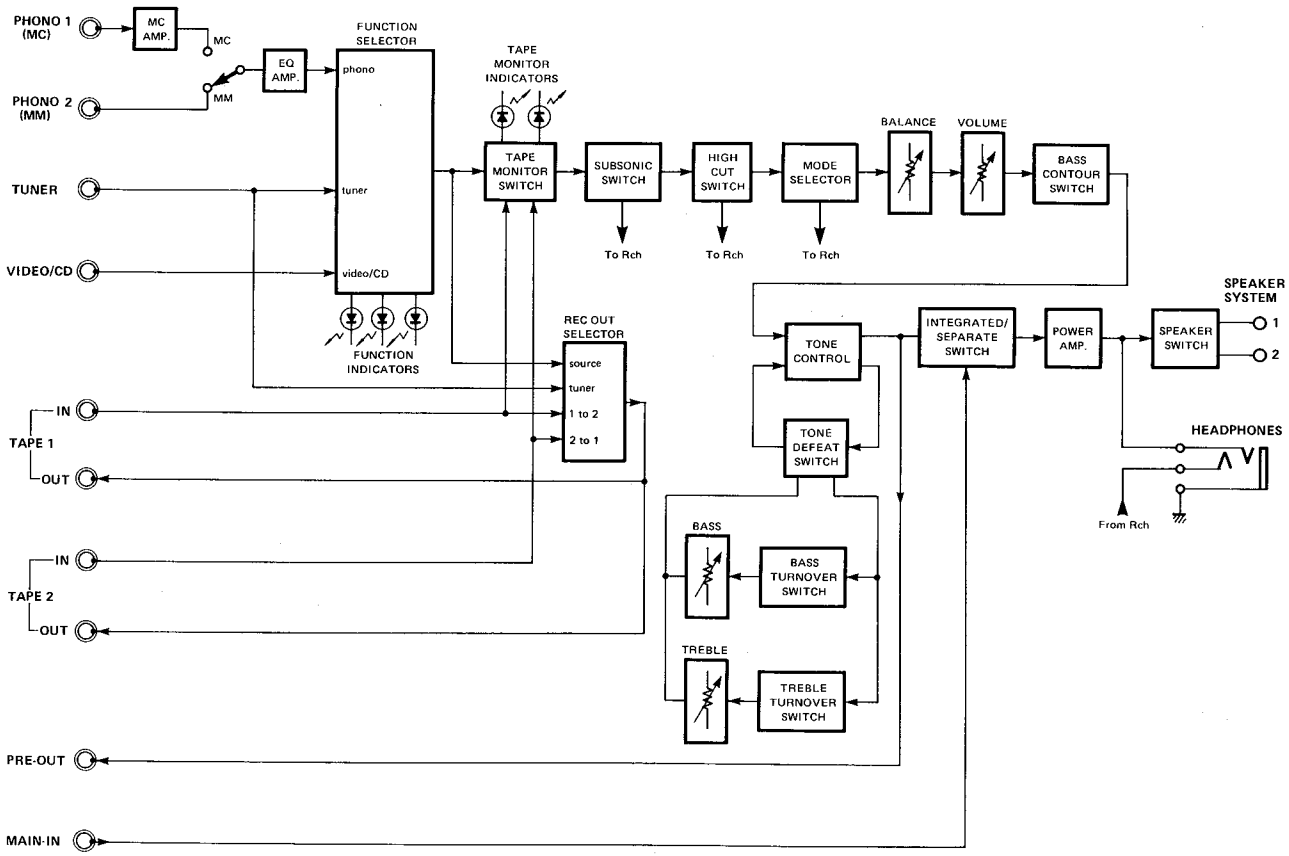
Step	Connection Equipments	Adjustment	For
1	Connect the Digital Volt Meter to TP1 and TP2.	VR401	0 ± 10mV
2	Connect the Digital Volt Meter to TP3 and TP2.	VR402	0 ± 10mV

■ IDLING CURRENT ADJUSTMENT

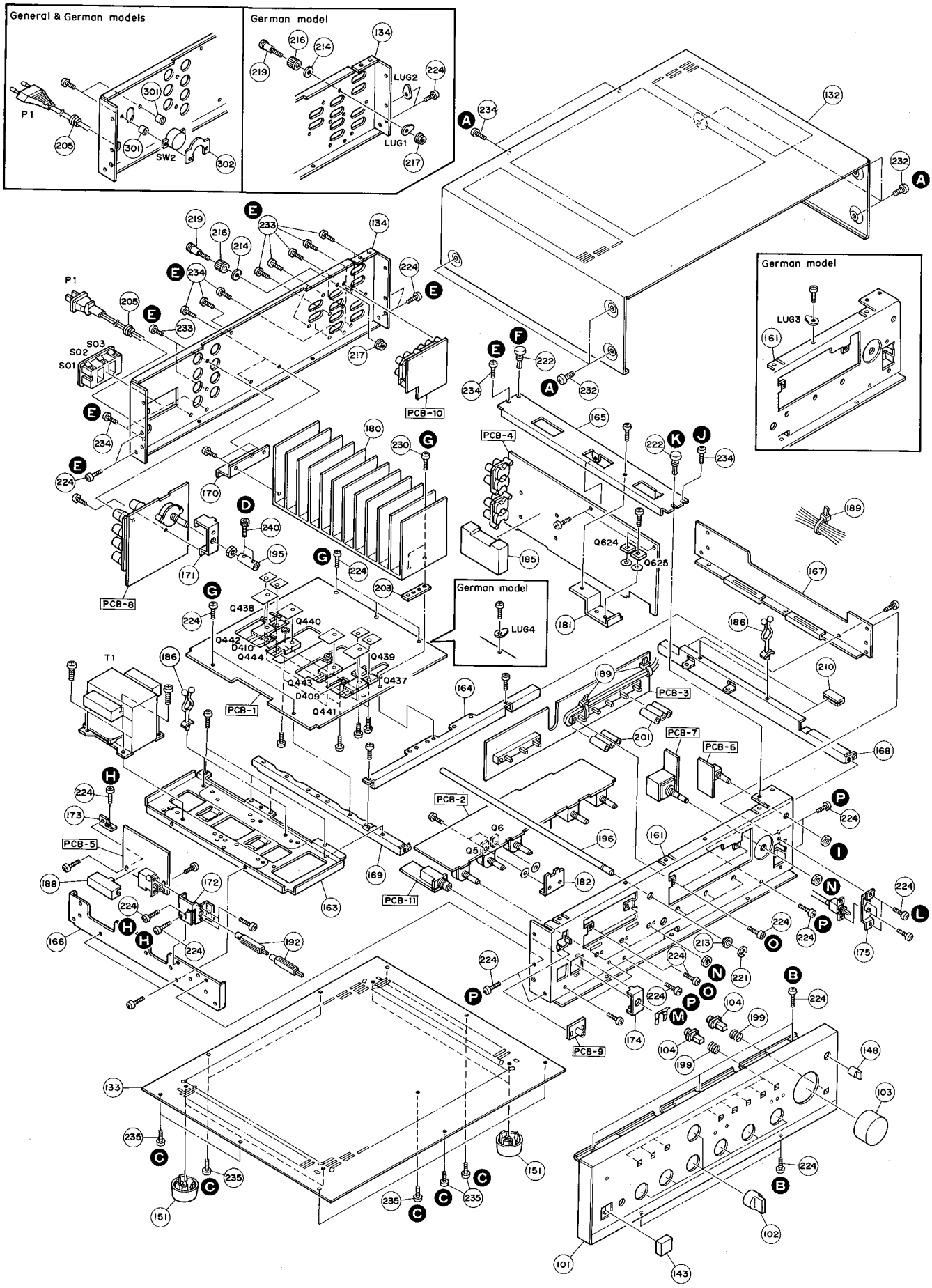
Step	Connection Equipments	Adjustment	For
1	Connect the Digital Volt Meter to TP4 and TP5.	VR403	30mV
2	Connect the Digital Volt Meter to TP6 and TP7.	VR404	30mV

■ After the above adjustment, leave the unit with its power on for longer than 15 minutes and then repeat the same adjustments.

BLOCK DIAGRAM



GENERAL UNIT EXPLODED VIEW



DISASSEMBLY PROCEDURES (REFER TO PAGES 4 AND 12)

1 CABINET TOP (132) REMOVAL
Remove 8 screws Ⓐ and remove the Cabinet Top (132).

2 FRONT PANEL ASSEMBLY (101) REMOVAL
1. Remove the Cabinet Top (132). (Refer to step 1 .)
2. Remove 5 screws Ⓑ and remove the Front Panel Assembly (101).

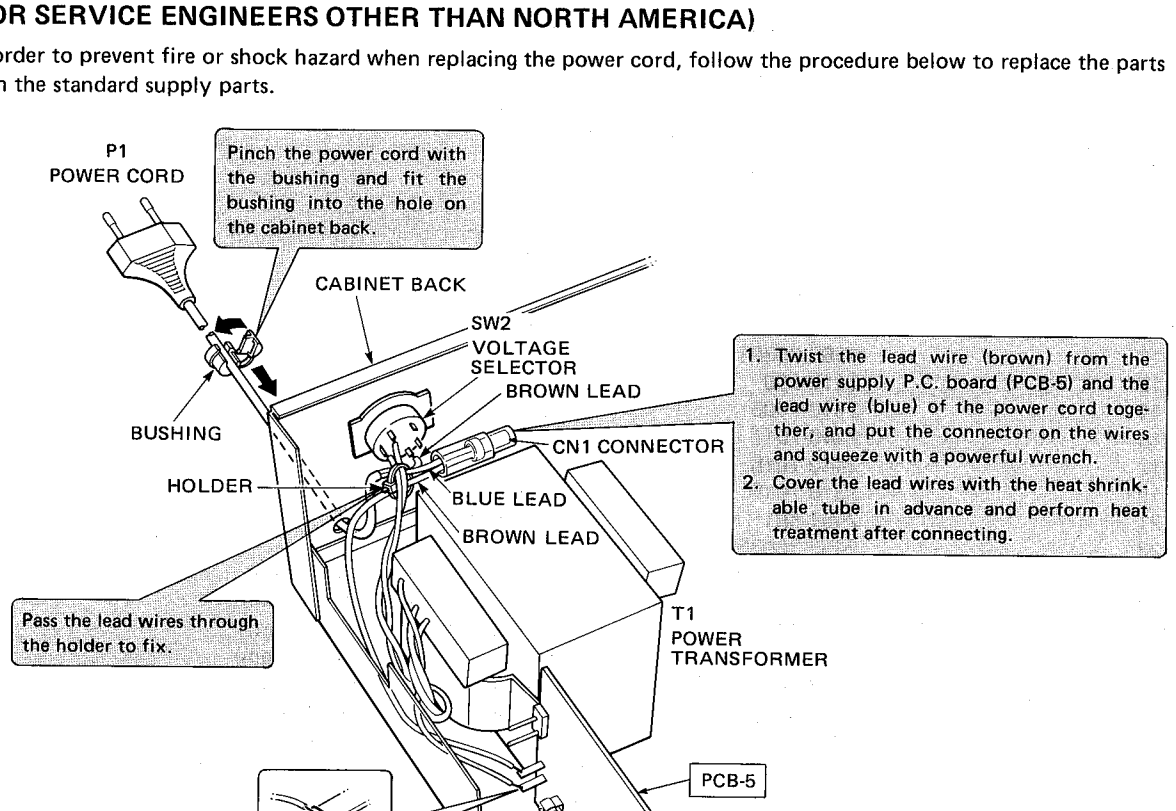
3 MAIN P.C. BOARD (PCB-1) REMOVAL
1. Remove 10 screws Ⓒ and remove the Cabinet Bottom (133).
2. Remove the Front Panel Assembly (101). (Refer to step 2 .)
3. Loosen 2 screws Ⓓ and pull out the Shaft (196) with the Speaker Selector Knob Assembly (102).
4. Remove 24 screws Ⓔ and fastener Ⓕ , then remove the Cabinet Back (134). If necessary, unsolder the lead wires from the Power Transformer (T1).
5. Remove 7 screws Ⓖ and remove the Main P.C. Board (PCB-1) with Heat Sink (180). At this time, unsolder the lead wires connected to the Main P.C. Board (PCB-1).

4 POWER SUPPLY P.C. BOARD (PCB-5) REMOVAL
1. Remove the Front Panel Assembly (101). (Refer to step 2 .)
2. Pull out the Power Push Button (143) and Levers (192).
3. Remove 3 screws Ⓗ and remove the Power Supply P.C. Board (PCB-5). If necessary, unsolder the lead wires.

5 TONE CONTROL AND PUSH SWITCHES P.C. BOARDS (PCB-2 and PCB-3) REMOVAL
1. Remove the Front Panel Assembly (101). (Refer to step 2 .)
2. Pull out the Shaft (196) with the Speaker Selector Knob Assembly (102). (Refer to step 3 -3.)
3. Pull out the 7 Knob Assemblies (102 and 103), Cap. Trim Knob (148), Power Push Button (143) and Levers (192).
4. Remove hexagon nut Ⓘ and remove the Capacitance Trim P.C. Board (PCB-6).
5. Remove screw Ⓙ , 2 fasteners Ⓕ and Ⓚ , 2 screws Ⓛ and screw Ⓔ mounting the Bracket (165), then remove the Bracket (165) with the Phono Equalizer P.C. Board (PCB-4).
6. Straighten the catches fixing the Power Indicator P.C. Board (PCB-9) and remove the Power Indicator P.C. Board (PCB-9).
7. Remove the metal fixture Ⓜ fixing the Headphones P.C. Board (PCB-11) and remove the Headphones P.C. Board (PCB-11).
8. Remove 7 hexagon nuts Ⓝ and remove 4 screws Ⓞ .
9. Remove 6 screws Ⓟ and the Chassis (161), then the Tone Control P.C. Board (PCB-2), Push Switches P.C. Board (PCB-3) and Volume Control P.C. Board (PCB-7) can be removed. Unsolder the lead wires if necessary when removing each P.C. Board.

POWER CORD REPLACEMENT
(FOR SERVICE ENGINEERS OTHER THAN NORTH AMERICA)

In order to prevent fire or shock hazard when replacing the power cord, follow the procedure below to replace the parts with the standard supply parts.


P1
POWER CORD
Pinch the power cord with the bushing and fit the bushing into the hole on the cabinet back.
CABINET BACK
SW2
VOLTAGE SELECTOR
BROWN LEAD
BUSHING
CN1 CONNECTOR
HOLDER
BLUE LEAD
BROWN LEAD
1. Twist the lead wire (brown) from the power supply P.C. board (PCB-5) and the lead wire (blue) of the power cord together, and put the connector on the wires and squeeze with a powerful wrench.
2. Cover the lead wires with the heat shrinkable tube in advance and perform heat treatment after connecting.
Pass the lead wires through the holder to fix.
T1
POWER TRANSFORMER
PCB-5
120 mm

GENERAL UNIT PARTS LIST

Ref. No.	Part No.	Description
101	A443-PM655A	Front Panel Assembly
102	A630-PM655A	Knob Assembly, Bass, Treble, Balance, Tape Monitor, Tape Out, Function, Speaker System Selector
103	A630-PM655B	Knob Assembly, Volume
104	A662-PM655A	Push Button Assembly, Bass Turnover, Tone Defeat, Treble Turnover, Pre-out Main-in, Bass Contour, Subsonic, High Cut, Mode, Cartridge
132	1414-05301	Cabinet Top
133	1423-02201	Cabinet Bottom
134	1424-14301	Cabinet Back (for U.S.A. and Canada models)
"	1424-14401	Cabinet Back (for General and German models)
143	1660-00401	Push Button, Power
148	1634-04501	Knob, Cap. Trim
151	1319-0139	Foot
161	2211-7260	Chassis
163	2219-8007	Bracket
164	2219-8008	Bracket
165	2219-8009	Bracket
166	2219-8010	Bracket
167	2219-8011	Bracket
168	2219-8012	Bracket
169	2219-8013	Bracket
170	2219-8014	Bracket
171	2219-8015	Bracket
172	2219-8016	Bracket
173	2219-8019	Bracket
174	2219-7879	Bracket
175	2219-8022	Bracket
180	2222-7173	Heat Sink (for U.S.A. and Canada models)
"	2222-7171	Heat Sink (for General and German models)
181	2222-7170	Heat Sink
182	2222-7179	Heat Sink
185	2240-7183	Protector
186	2240-7050	Holder
188	2240-7176	Protector
189	2240-7120	Holder
192	2672-7018	Lever
195	2601-7069	Shaft
196	2601-7131	Shaft
199	2651-210189	Spring
201	2132-7126	Spacer
203	2224-7069	Insulator
205	2114-415027	Bushing
210	1568-00301	Frame
213	2410-100	Special Washer
214	2410-7005	Special Washer
216	2440-7011	Special Nut
217	2440-7016	Special Nut
219	2310-7015	Special Screw
221	2461-501	E-Stop Ring
222	2459-3003511	Snap-in-fastener
224	2347-300627	Self-tapping Screw (+) (3 x 6 mm)
230	2347-301027	Self-tapping Screw (+) (3 x 10 mm)
232	2347-400647	Self-tapping Screw (+) (4 x 6 mm)
233	2347-301041	Self-tapping Screw (+) (3 x 10 mm)
234	2347-300647	Self-tapping Screw (+) (3 x 6 mm)
235	2347-300827	Self-tapping Screw (+) (3 x 8 mm)
240	2396-300549	Hexagon-socket-head Screw (3 x 5 mm)
301	2132-7116	Spacer (only General and German models)
302	2440-7017	Special Nut (only General and German models)
	1111-J30173	Owner Guide (for U.S.A. model)
	1111-J30174	Owner Guide (for Canada, General and German models)
	1221-777143	Packing Box
	1222-7225	Packing Cushion, Right
	1222-7226	Packing Cushion, Left

ELECTRICAL PARTS LIST

Ref. No.	Part No.	Description
	CHASSIS MISCELLANEOUS	
⚠ P1	4161-71151	Power Cord (for U.S.A. and Canada models)
⚠ "	4161-7256	Power Cord (for General and German models)
⚠ T1	5584-701487	Power Transformer (for U.S.A. & Canada models)
⚠ "	5584-701488	Power Transformer (for General and German models)
⚠ SW2	4411-102729	Rotary Switch, Voltage Selector (only General and German models)
⚠ SO1/2/3	4474-156	AC Outlet, Unswitched, Switched (only U.S.A. and Canada models)
⚠ CN1	4443-712	Connector, Power Cord (only General and German models)
⚠ F1	5732-632029	Fuse, 6.3A, 125V (for U.S.A. and Canada models)
⚠ "	5732-312030	Fuse, T3.15A, 250V (for General and German models)
⚠ F2, 3, 4, 5	5732-502029	Fuse, 5A, 125V (only Canada model)
LUG1, 2, 3, 4	4211-4	Lug Terminal (only German model)
	4442-14	Pin Plug (for Phono Input Jacks) (Accessory)
	PCB-1 MAIN P.C. BOARD	
	RESISTORS	
R423, 424	5174-621381	620Ω, ±1%, 1/4W, Metal
R425, 426	5174-330381	33Ω, ±1%, 1/4W, Metal
⚠ R427, 428, 429, 430	5102-5614713	560Ω, ±2%, 1/4W, Fuse
R433, 434	5174-243381	24kΩ, ±1%, 1/4W, Metal
⚠ R443, 444, 445, 446, 451, 452, 453, 454	5102-1514713	150Ω, ±2%, 1/4W, Fuse
R447, 448, 449, 450	5174-123381	12kΩ, ±1%, 1/4W, Metal
⚠ R461, 462, 463, 464	5102-2205711	22Ω, ±5%, 1W, Fuse
⚠ R465, 466, 467, 468	5102-1014713	100Ω, ±2%, 1/4W, Fuse
⚠ R469, 470, 471, 472	5102-2R2579	2.2Ω, ±5%, 1/4W, Fuse
⚠ R481, 482	5102-6804713	68Ω, ±2%, 1/4W, Fuse
R483/485, 484/486	5275-R22671	0.22Ω, ±10%, 5W x 2, Cement (Special Dual)
R487, 488	5175-150571	15Ω, ±5%, 3W, Metal
R489, 490	5171-220572	22Ω, ±5%, 1W, Metal
R491, 492	5171-1R5572	1.5Ω, ±5%, 1W, Metal
	CONTROLS	
VR401, 402	5101-50371920	50kΩ
VR403, 404	5101-20171920	200Ω
	CAPACITORS	
C2, 3, 4, 5	5352-1041957	0.1μF, ±10%, 250V, Metalized Polyester
⚠ C6, 7, 8, 9	5341-478F0955	4700μF, ±20%, 50V, Electrolytic
C10	5345-475F0952	4.7μF, ±20%, 50V, Electrolytic
C11	5345-336B0952	33μF, ±20%, 10V, Electrolytic
C15	5353-330534	33pF, ±5%, 500V, Mica
C60	5352-1040962	0.1μF, ±20%, 400V, Metalized Polyester (only German model)
C401, 402	5345-107B0951	100μF, ±20%, 10V, Electrolytic
C403, 404	5359-4715851	470pF, ±5%, 100V, Polypropylene
C405, 406	5345-476D041	47μF, ±20%, 25V, Electrolytic
C407, 408	5353-020934	2pF, ±0.5pF, 500V, Mica
C409, 410	5353-680534	68pF, ±5%, 500V, Mica
C411, 412, 417, 418	5345-106C041	10μF, ±20%, 16V, Electrolytic
⚠ C413, 414, 415, 416	5345-337F041	330μF, ±20%, 50V, Electrolytic
	TRANSISTORS	
Q1, 3	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q2, 4, 7	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q8	5613-1845(E)	2SC1845(E) or 2SC1845(F)
Q9, 10, 415, 416	5611-970(BL)	2SA970(BL)
Q401, 402	5616-2SK364(V)	F.E.T., 2SK364(V) or 2SK364(BL)
Q403, 404, 405, 406, 413, 414, 419, 420	5613-2240(BL)	2SC2240(BL)
Q407, 408, 409, 410	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q411, 412, 421, 422, 425, 426	5612-646A(C)	2SB646A(C)

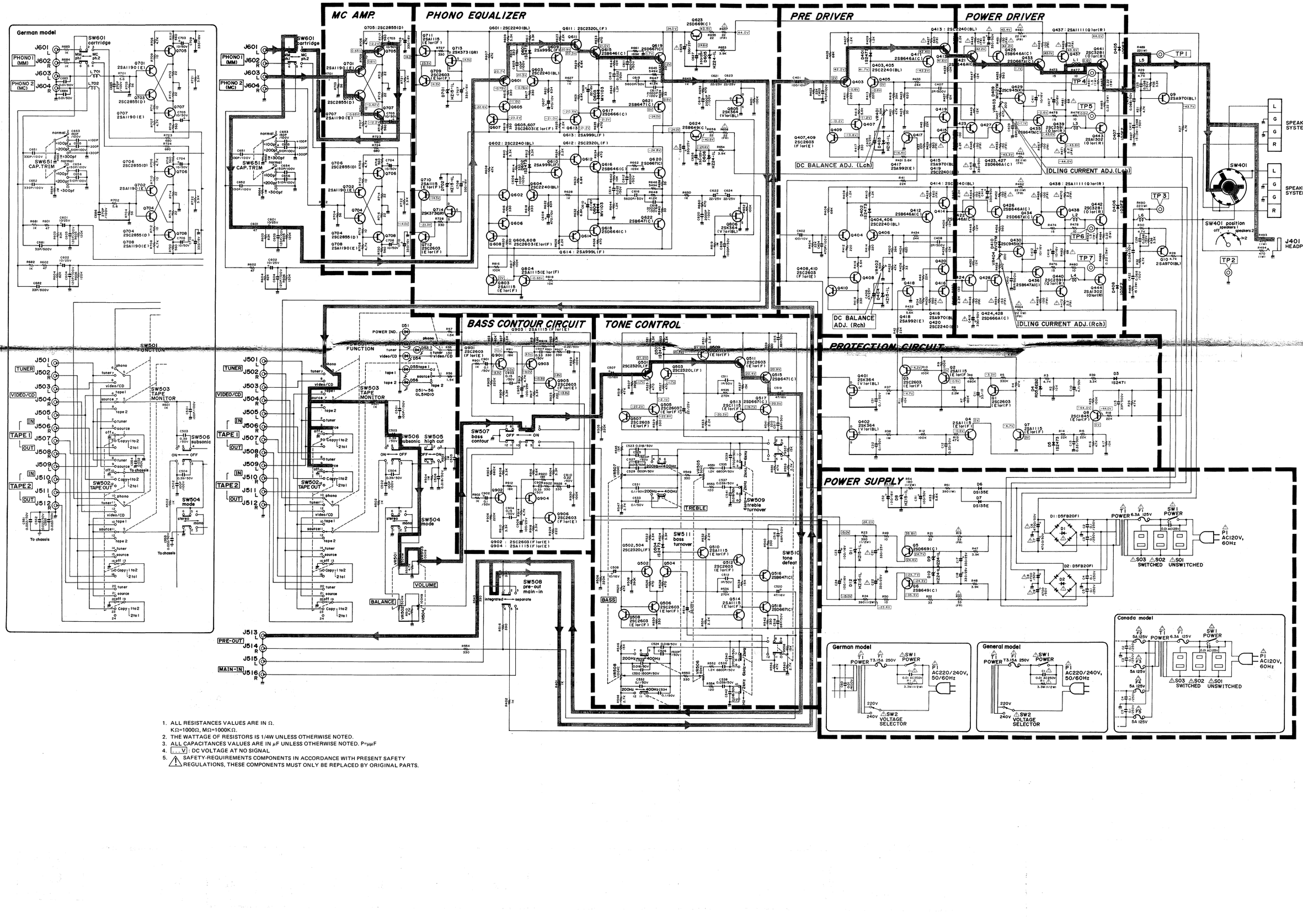
Ref. No.	Part No.	Description
Q417, 418	5611-992(E)	2SA992(E)
Q423, 424, 427, 428	5614-666A(C)	2SD666A(C)
Q429, 430	5613-945(K)	2SC945(K)
Q433, 434	5614-667A(C)	2SD667A(C)
Q435, 436	5612-647A(C)	2SB647A(C)
Q437, 438	5611-1111(Q)	2SA1111(Q) or 2SA1111(R) (w/Insulator and Bushing)
Q439, 440	5613-2591(Q)	2SC2591(Q) or 2SC2591 (R) (w/Insulator and Bushing)
Q441, 442	5613-3281(O)	2SC3281(O) or 2SC3281(R) (w/Insulator)
Q443, 444	5611-1302(O)	2SA1302(O) or 2SA1302(R) (w/Insulator)
	DIODES	
⚠ D1, 2	5685-D5FB20F1	Bridge Silicon, D5FB20F1
D3	5636-1S2471	1S2471
D4	5635-RD5R6EB2	Zener, RD5.6EB2
D5, 401, 402	5631-1S2473	1S2473
D403, 404	5635-HZ15-1L	Zener, HZ15-1L
D405, 406, 407, 408	5632-10DF2	10DF2
D409, 410	5641-MV12YM	Varistor, MV12YM
	COILS	
L1, 2, 3, 4	5597-35502	Ferrite Bead
L5, 6	5991-7165	
	MISCELLANEOUS	
CN401	4443-040185	Connector, 4 Pos.
	PCB-2 TONE CONTROL P.C. BOARD	
	RESISTORS	
⚠ R19, 20	5102-3304713	33Ω, ±2%, 1/4W, Fuse
	CONTROLS	
VR501, 502	5113-50396122	50kΩMN, Balance (w/Hexagon Nut)
VR505, 506	5113-50373148	50kΩC, Treble (w/Hexagon Nut)
VR507, 508	5113-10474148	100kΩC, Bass (w/Hexagon Nut)
	CAPACITORS	
C17, 18, 21, 22	5345-337D041	330μF, ±20%, 25V, Electrolytic
C23, 24	5345-107C041	100μF, ±20%, 16V, Electrolytic
C501, 502	5359-1015851	100pF, ±5%, 100V, Polypropylene
C507, 508	5345-106C0951	10μF, ±20%, 16V, Electrolytic
C511, 512	5353-010934	1pF, ±0.5pF, 500V, Mica
C513, 514	5345-226D0951	22μF, ±20%, 25V, Electrolytic
C515, 516, 517, 518	5353-680534	68pF, ±5%, 500V, Mica
C519, 520	5345-476C0951	47μF, ±20%, 16V, Electrolytic
C901, 902	5345-104F0951	0.1μF, ±20%, 50V, Electrolytic
C905, 906	5345-107D041	100μF, ±20%, 25V, Electrolytic
C909, 910	5345-224F0951	0.22μF, ±20%, 50V, Electrolytic
	TRANSISTORS	
Q5	5614-669(C)	2SD669(C) (w/Insulator)
Q6	5612-649(C)	2SB649(C) (w/Insulator)
Q501, 502, 503, 504	5613-2320L(F)	2SC2320L(F)
Q505, 506, 507, 508, 511, 512	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q509, 510, 513, 514	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q515, 516	5612-647(C)	2SB647(C)
Q517, 518	5614-667(C)	2SD667(C)
Q901, 902, 905, 906	5613-2603(F)	2SC2603(F) or 2SC2603(E)
Q903, 904	5611-1115(F)	2SA1115(F) or 2SA1115(E)
	DIODES	
D9, 10	5635-HZ24-1L	Zener, HZ24-1L
D11, 12	5635-HZ15-1L	Zener, HZ15-1L
D503, 504	5631-1S2473	1S2473
	MISCELLANEOUS	
SW501, 503	4412-043742	Rotary Slide Switch, Function, Tape Monitor (w/Hexagon Nut)
SW502	4412-045752	Rotary Slide Switch, Tape Out (w/Hexagon Nut)

Ref. No.	Part No.	Description
	PCB-3 PUSH SWITCHES P.C. BOARD	
D52, 53, 54, 55, 56	5637-GL5HD10	L.E.D., GL5HD10, Red, Function and Tape Monitor Indicators
SW504/505/506/507/508	4431-05127159	Push Switch, Mode, High Cut, Subsonic, Bass Contour, Pre-out/Main-in
SW509/510/511	4431-03127158	Push Switch, Treble Turnover, Tone Defeat, Bass Turnover
	PCB-4 PHONO EQUALIZER P.C. BOARD	
	RESISTORS	
R621, 622	5174-Z634038	634Ω, ±1%, 1/4W, Metal
R627, 628	5174-102381	1kΩ, ±1%, 1/4W, Metal
R645, 646	5174-Z549338	549kΩ, ±1%, 1/4W, Metal
R647, 648	5174-Z412238	41.2kΩ, ±1%, 1/4W, Metal
⚠ R657, 658	5102-2204713	22Ω, ±2%, 1/4W, Fuse
R661, 662	5174-Z169338	169kΩ, ±1%, 1/4W, Metal
R717, 718, 719, 720	5174-561381	560Ω, ±1%, 1/4W, Metal
	CAPACITORS	
C601, 602	5345-106D0951	10μF, ±20%, 25V, Electrolytic
C603, 604	5359-1215851	120pF, ±5%, 100V, Polypropylene
C605, 606	5359-1015851	100pF, ±5%, 100V, Polypropylene
C607, 608	5345-477B0952	470μF, ±20%, 10V, Electrolytic
C609, 610	5345-226C041	22μF, ±20%, 16V, Electrolytic
C617, 618, 619, 620	5359-2025851	2000pF, ±5%, 100V, Polypropylene
C621, 622, 623, 624	5345-226D0226	22μF, ±20%, 25V, Electrolytic
C625, 626, 627, 628	5345-337D041	330μF, ±20%, 25V, Electrolytic
C651, 652	5359-3315851	330pF, ±5%, 100V, Polypropylene
C681, 682	5353-330534	33pF, ±5%, 500V, Mica (only German model)
C685, 686	5359-2715851	270pF, ±5%, 100V, Polypropylene (only German model)
C703, 704, 705, 706	5345-106F0226	10μF, ±20%, 50V, Electrolytic
C707, 708, 709, 710	5345-337C041	330μF, ±20%, 16V, Electrolytic
	TRANSISTORS	
Q601, 602, 603, 604	5613-2240(BL)	2SC2240(BL)
Q605, 606, 607, 608, 709, 712	5613-2603(E)	2SC2603(E) or 2SC2603(F)
Q609, 610, 613, 614	5611-999L(F)	2SA999L(F)
Q611, 612	5613-2320L(F)	2SC2320L(F)
Q615, 616	5612-646(C)	2SB646(C)
Q617, 618	5614-666(C)	2SD666(C)
Q619, 620	5614-667(C)	2SD667(C)
Q621, 622	5612-647(C)	2SB647(C)
Q623	5614-669(C)	2SD669(C) (w/Insulator)
Q624	5612-649(C)	2SB649(C) (w/Insulator)
Q701, 702, 707, 708	5611-1190(E)	2SA1190(E)
Q703, 704, 705, 706	5613-2855(D)	2SC2855(D)
Q710, 711, 803, 804	5611-1115(E)	2SA1115(E) or 2SA1115(F)
Q713, 714	5616-2SK373GR	F.E.T., 2SK373 (GR)
Q805, 806	5616-2SK364(V)	F.E.T., 2SK364(V) or 2SK364(BL)
	DIODES	
D601, 602	5631-1S2473	1S2473
D603, 604	5641-MV103	Varistor, MV103
D605, 606	5635-HZ24-1L	Zener, HZ24-1L
D701, 702	5635-HZ15-1L	Zener, HZ15-1L
	COILS	
L701, 702	5597-3	Ferrite Bead (only German model)
	MISCELLANEOUS	
SW601	4422-70211	Remote Switch, Cartridge
J501/502/503/504, 601/602/603/604	4484-31	4-Pin Jack, Tuner, Video/CD, Phono 1 (MM), Phono 2 (MC)
CN601, 603, 604	4443-030185	Connector, 3 Pos.
CN602	4443-070185	Connector, 7 Pos.

Ref. No.	Part No.	Description
	PCB-5 POWER SUPPLY P.C. BOARD	
	RESISTORS	
⚠ R1	5135-335J50P	3.3MΩ, ±5%, 1/2W, Carbon (only General and German models)
R51	5171-391572	390Ω, ±5%, 1W, Metal
	CAPACITORS	
⚠ C1	5352-1030959	0.01μF, ±20%, AC125V, Metalized Polyester (for U.S.A. and Canada models)
⚠ "	5352-1030958	0.01μF, ±20%, AC250V, Metalized Polyester (for General and German models)
C51	5345-107F041	100μF, ±20%, 50V, Electrolytic
C52	5345-107C041	100μF, ±20%, 16V, Electrolytic
	DIODES	
D6, 7	5632-DS135E	DS135E
D8	5635-HZ15-1L	Zener, HZ15-1L
	MISCELLANEOUS	
⚠ SW1	4431-01018158	Push Switch, Power
CN51	4443-030185	Connector, 3 Pos.
	4472-7113	Fuse Holder (for U.S.A. and Canada models)
	4472-7122	Fuse Holder (for General and German models)
	PCB-6 CAPACITANCE TRIM P.C. BOARD	
	CAPACITORS	
C653, 654	5359-1515851	150pF, ±5%, 100V, Polypropylene
C655, 656	5359-5115851	510pF, ±5%, 100V, Polypropylene
	MISCELLANEOUS	
SW651	4411-204714	Rotary Switch, Cap. Trim (w/Hexagon Nut)
	PCB-7 VOLUME CONTROL P.C. BOARD	
VR503, 504	5113-10472147	Control, 100kΩB, Volume (w/Hexagon Nut)
	PCB-8 SPEAKERS P.C. BOARD	
R493, 494	5171-471572	Resistor, 470Ω, ±5%, 1W, Metal
SW401	4411-1047110	Rotary Switch, Speaker System Selector (w/Hexagon Nut)
TE401	4214-156	Terminal, Speaker System 1/2
	PCB-9 POWER INDICATOR P.C. BOARD	
D51	5637-GL5HD10	L.E.D., GL5HD10, Red, Power Indicator
	PCB-10 INPUT/OUTPUT JACKS P.C. BOARD	
J505/506/507/508, 509/510/511/512, 513/514/515/516	4484-27	4-Pin Jack, Tape 1 In/Out, Tape 2 In/Out, Pre-out, Main-in
	PCB-11 HEADPHONES P.C. BOARD	
J401	4451-00159	Jack, Headphones

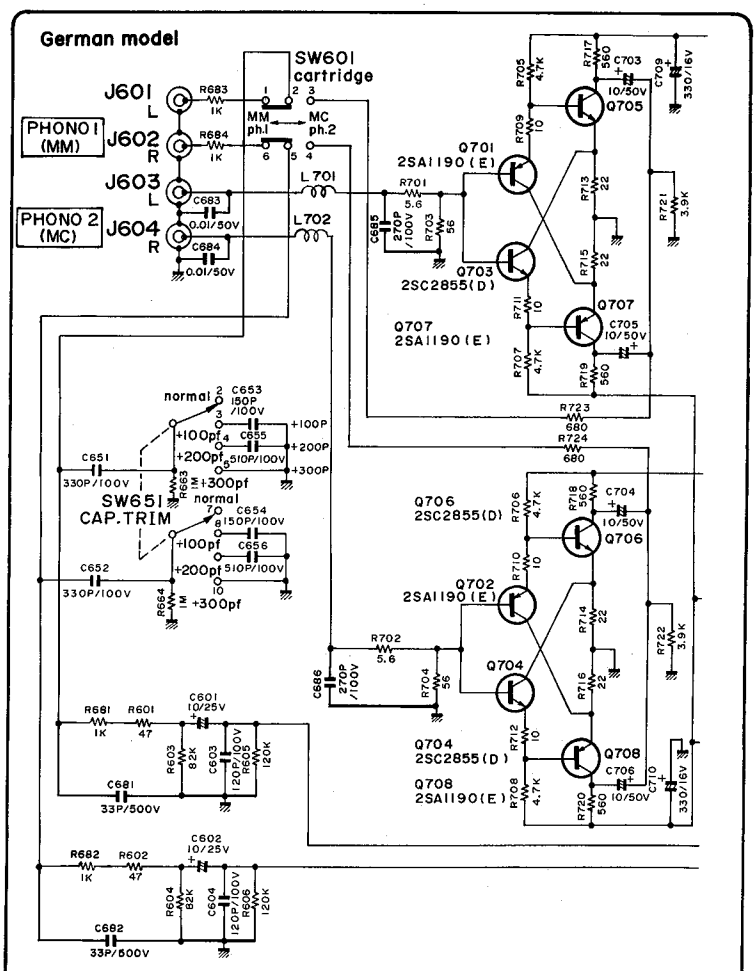
⚠ SAFETY RELATED COMPONENT. USE ONLY EXACT REPLACEMENT PART AS SPECIFIED.

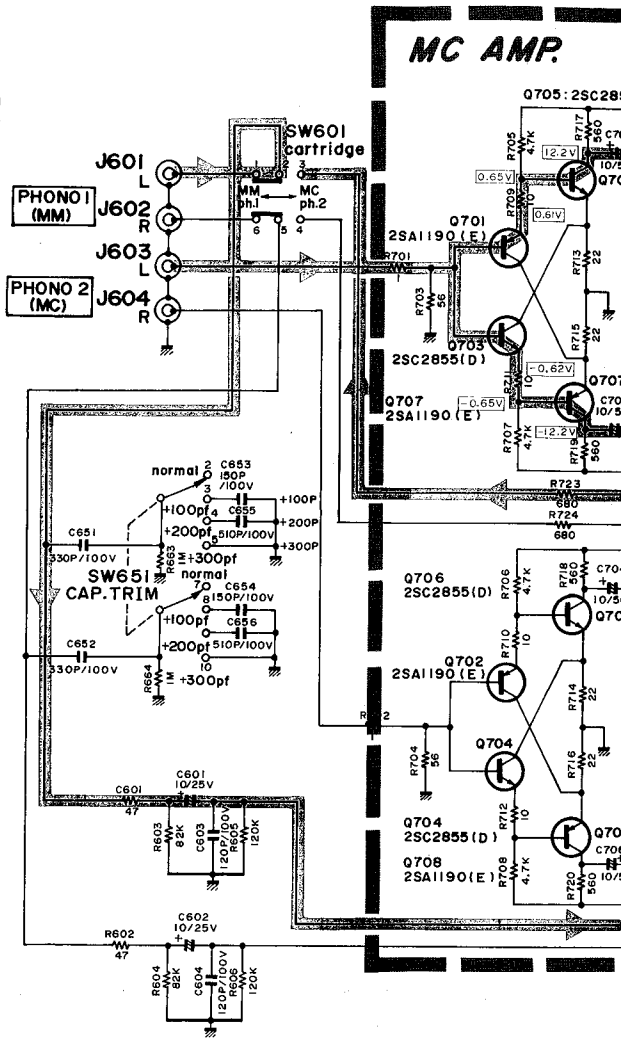
SCHEMATIC DIAGRAM

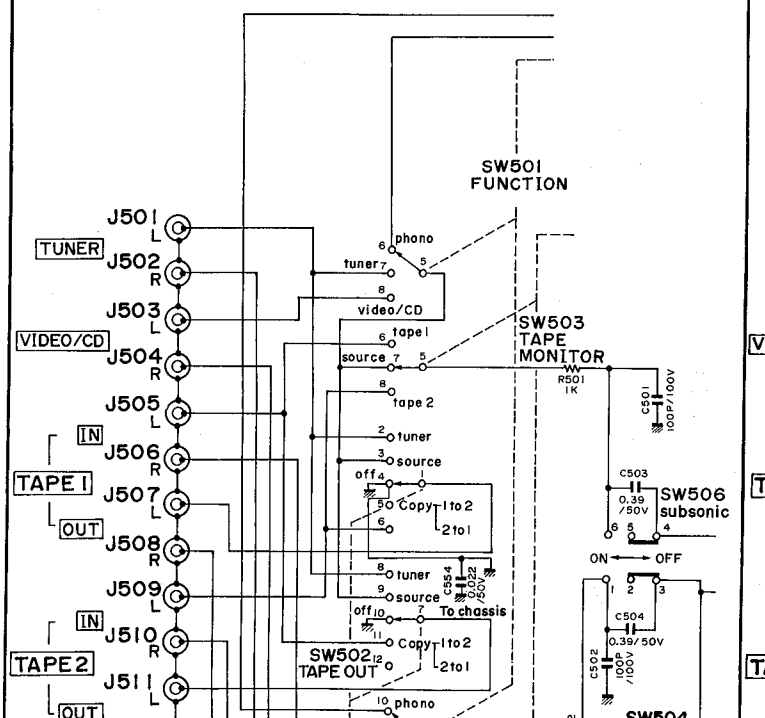


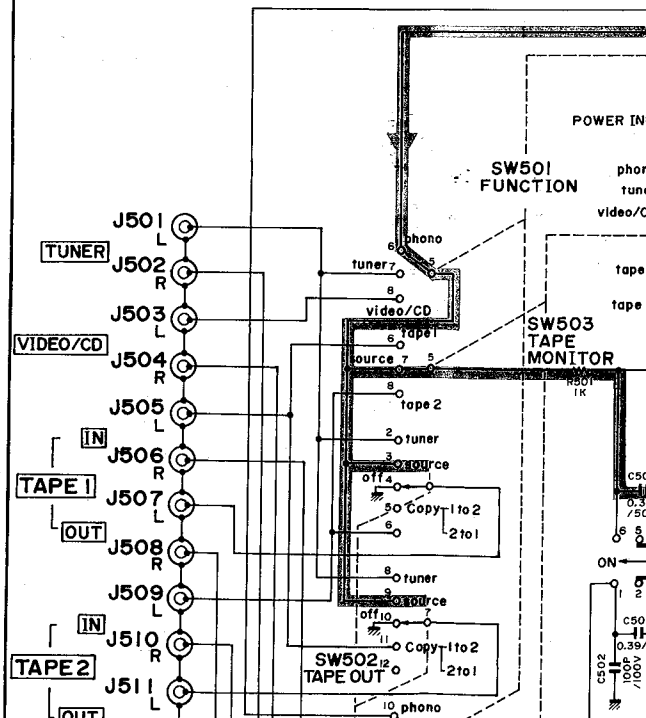
1. ALL RESISTANCES VALUES ARE IN Ω.
   KΩ=1000Ω, MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF
4. [. . V] : DC VOLTAGE AT NO SIGNAL
5. ⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.

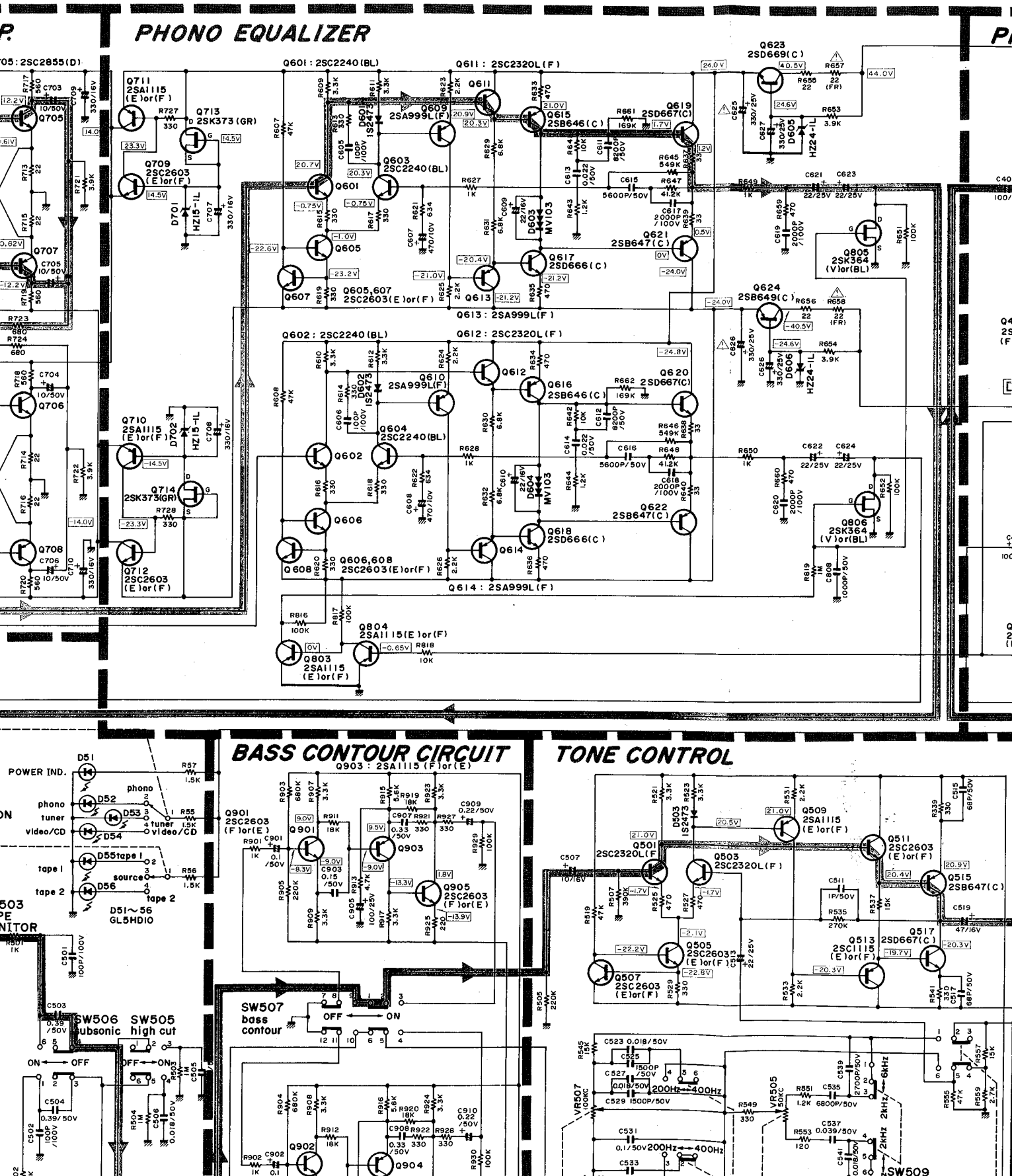
SCHEMATIC DIAGRAM

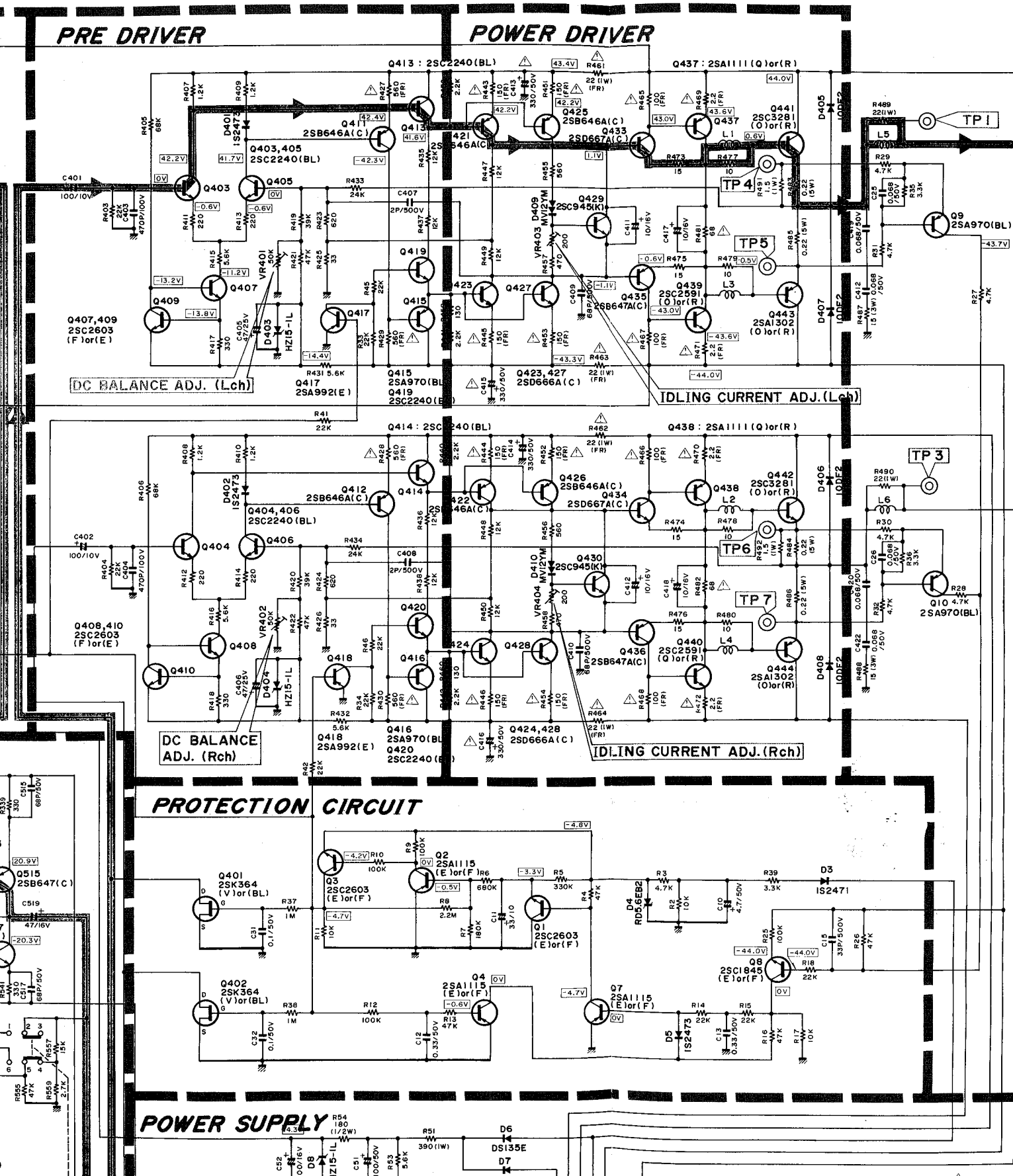




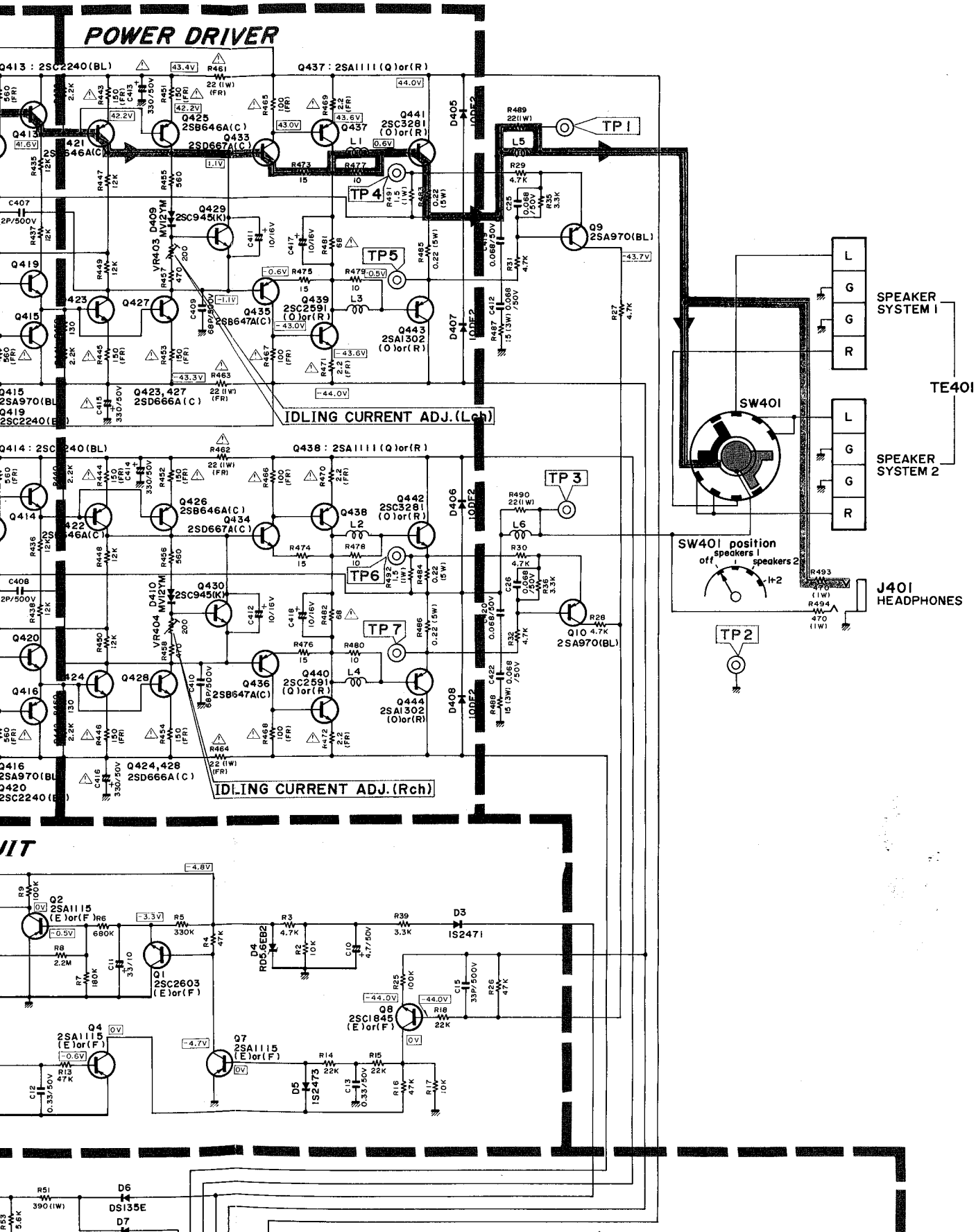


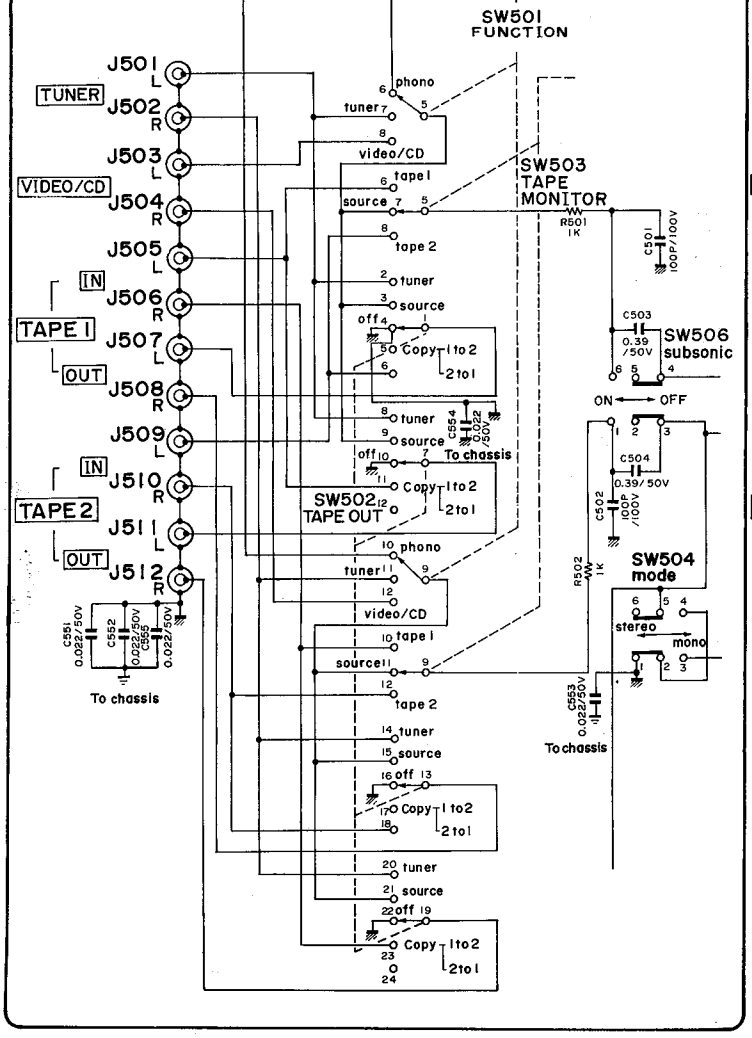


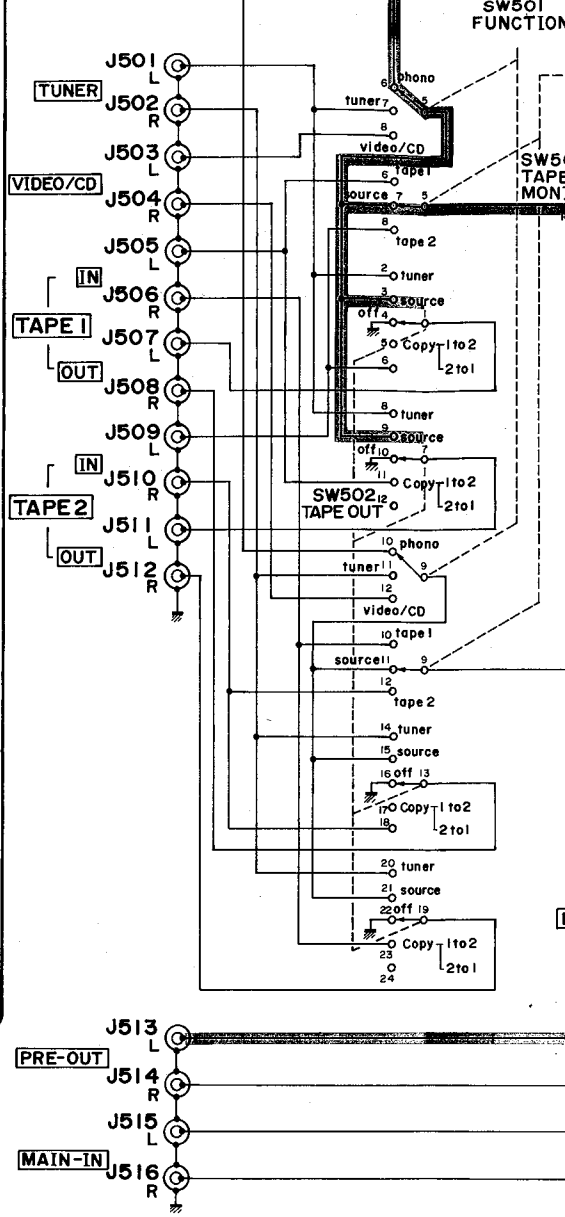

PHONO EQUALIZER
BASS CONTOUR CIRCUIT
TONE CONTROL
Q601 : 2SC2240(BL)
Q611 : 2SC2320L(F)
Q602 : 2SC2240(BL)
Q612 : 2SC2320L(F)
Q613 : 2SA999L(F)
Q614 : 2SA999L(F)
Q605,607 2SC2603(E)or(F)
Q606,608 2SC2603(E)or(F)
Q903 : 2SA1115(F)or(E)
POWER IND.
phono
tuner
video/CD
tape 1
tape 2
source
SW506 subsonic
SW505 high cut
SW507 bass contour
SW509


PRE DRIVER
POWER DRIVER
Q413 : 2SC2240(BL)
Q437 : 2SA1111(Q)or(R)
Q411 2SB646A(C)
Q413 2SB646A(C)
Q403,405 2SC2240(BL)
Q425 2SB646A(C)
Q433 2SD667A(C)
Q441 2SC3281 (O)or(R)
Q437
Q403
Q405
Q429 2SC945(K)
Q439 2SC2591 (O)or(R)
Q435 2SB647A(C)
Q443 2SA1302 (O)or(R)
Q407,409 2SC2603 (F)or(E)
Q409
Q407
Q419
Q415
Q423
Q427
Q417
D401 1S2473
D403 HZ15-1L
VR401 50K
DC BALANCE ADJ. (Lch)
Q417 2SA992(E)
Q415 2SA970(BL)
Q419 2SC2240(BL)
Q423,427 2SD666A(C)
IDLING CURRENT ADJ.(Lch)
TP1
TP4
TP5
L1
L3
L5
Q9 2SA970(BL)
Q414 : 2SC2240(BL)
Q438 : 2SA1111(Q)or(R)
Q412 2SB646A(C)
Q426 2SB646A(C)
Q434 2SD667A(C)
Q442 2SC3281 (O)or(R)
Q404,406 2SC2240(BL)
Q438
Q404
Q406
Q430 2SC945(K)
Q436 2SC2591 (Q)or(R)
Q444 2SA1302 (O)or(R)
Q408,410 2SC2603 (F)or(E)
Q408
Q410
Q420
Q416
Q424
Q428
Q418
D402 1S2473
D404 HZ15-1L
VR402 50K
DC BALANCE ADJ. (Rch)
Q418 2SA992(E)
Q416 2SA970(BL)
Q420 2SC2240(BL)
Q424,428 2SD666A(C)
IDLING CURRENT ADJ.(Rch)
TP3
TP6
TP7
L2
L4
L6
Q10 2SA970(BL)
PROTECTION CIRCUIT
Q401 2SK364 (V)or(BL)
Q402 2SK364 (V)or(BL)
Q3 2SC2603 (E)or(F)
Q2 2SA1115 (E)or(F)
Q1 2SC2603 (E)or(F)
Q4 2SA1115 (E)or(F)
Q7 2SA1115 (E)or(F)
Q8 2SC1845 (E)or(F)
D4 RD5.6EB2
D5 1S2473
D3 1S2471
POWER SUPPLY
D6 DSI35E
D7
D8 HZ15-1L
Q515 2SB647(C)

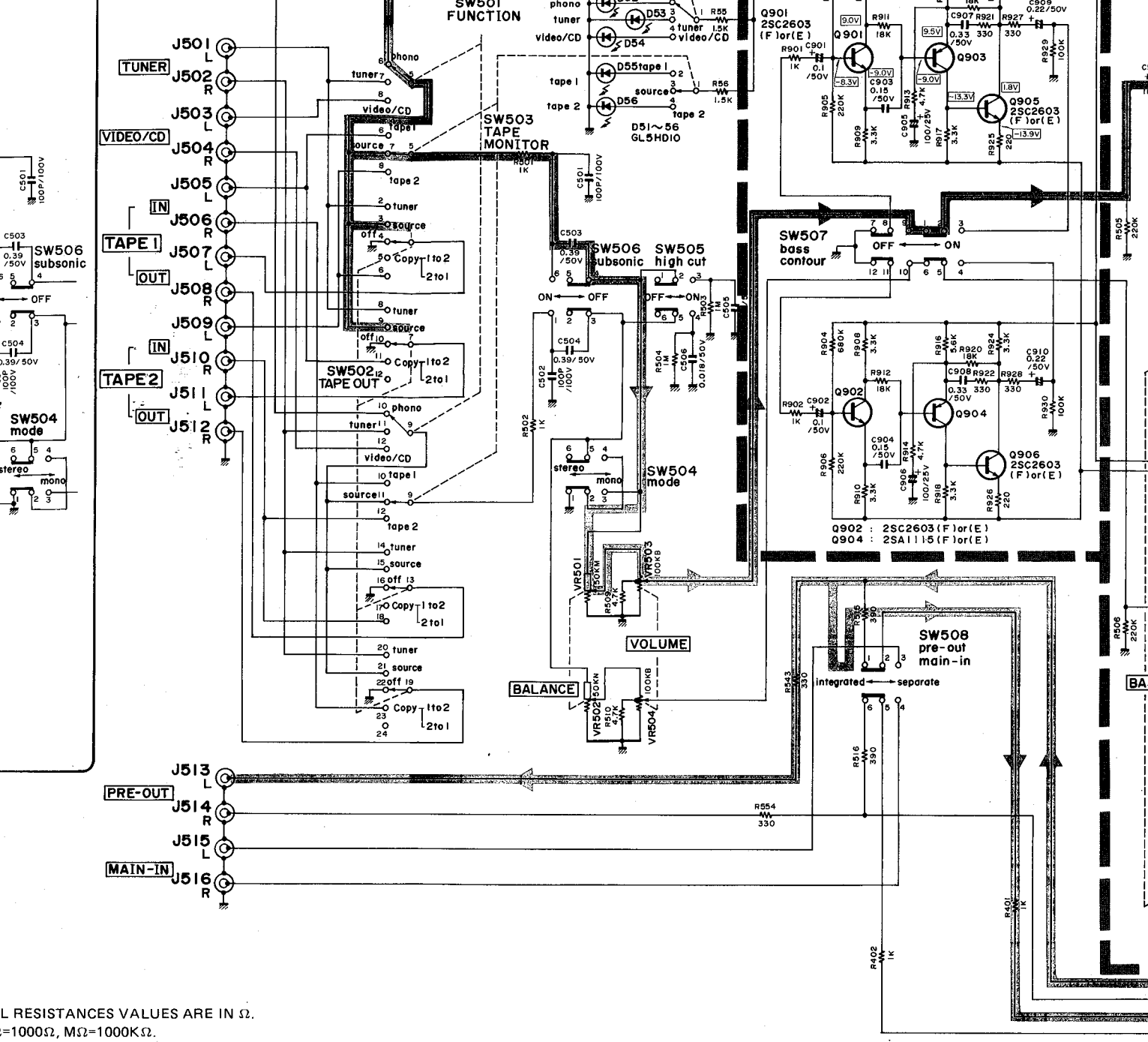
	K	L	M	N


POWER DRIVER
Q413 : 2SC2240(BL)
Q437 : 2SA1111(Q)or(R)
Q425 2SB646A(C)
Q433 2SD667A(C)
Q441 2SC3281 (O)or(R)
Q437
L1
L5
TP1
TP4
TP5
Q429 2SC945(K)
D409 MV12YM
VR403
Q439 2SC2591 (O)or(R)
Q435 2SB647A(C)
Q443 2SA1302 (O)or(R)
Q9 2SA970(BL)
Q423,427 2SD666A(C)
IDLING CURRENT ADJ.(Lch)
Q414 : 2SC2240(BL)
Q438 : 2SA1111(Q)or(R)
Q426 2SB646A(C)
Q434 2SD667A(C)
Q442 2SC3281 (O)or(R)
L2
L6
TP3
TP6
Q430 2SC945(K)
D410 MV12YM
VR404
Q440 2SC2591 (Q)or(R)
Q436 2SB647A(C)
Q444 2SA1302 (O)or(R)
Q10 2SA970(BL)
TP7
Q424,428 2SD666A(C)
IDLING CURRENT ADJ.(Rch)
SW401
SW401 position
off
speakers 1
speakers 2
1+2
TP2
L
G
G
R
SPEAKER SYSTEM 1
SPEAKER SYSTEM 2
TE401
J401 HEADPHONES
Q2 2SA1115 (E)or(F)
Q1 2SC2603 (E)or(F)
Q4 2SA1115 (E)or(F)
Q7 2SA1115 (E)or(F)
Q8 2SC1845 (E)or(F)
D3 1S2471
D4 RD5.6EB2
D5 1S2473
D6 DS135E
D7

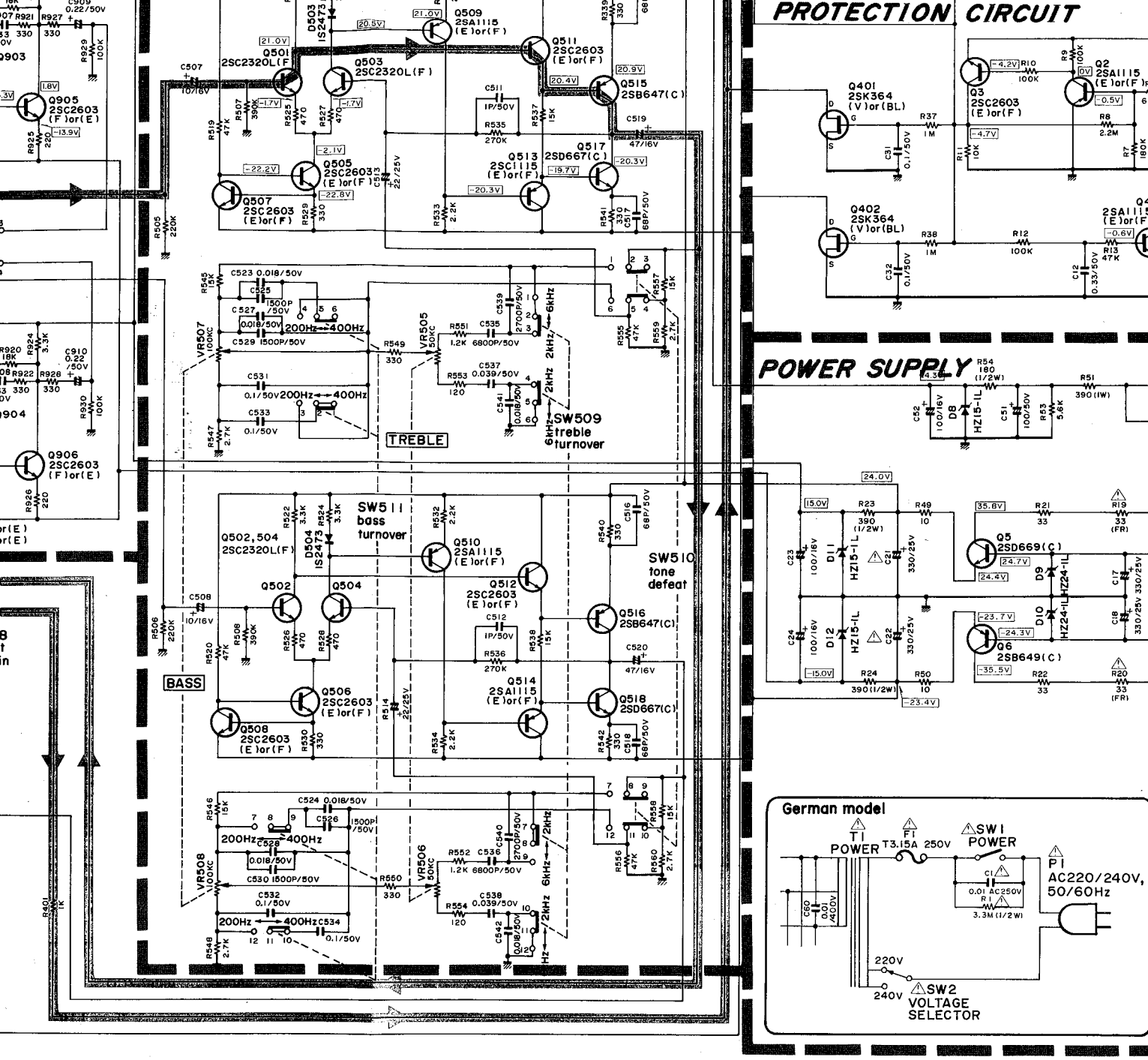


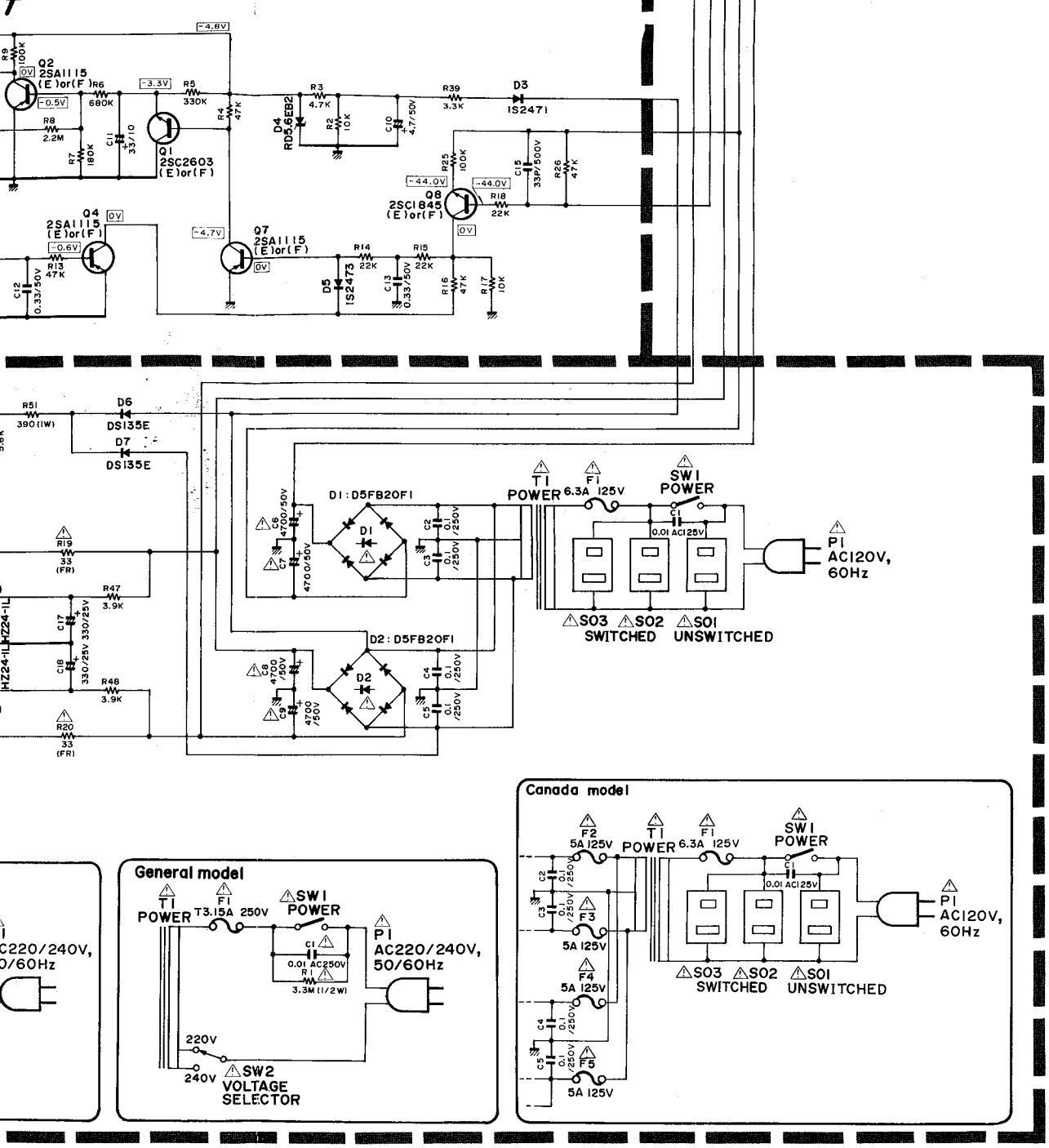


1. ALL RESISTANCES VALUES ARE IN Ω.
   KΩ=1000Ω, MΩ=1000KΩ.
2. THE WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
3. ALL CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμ
4. [...V] : DC VOLTAGE AT NO SIGNAL
5. ⚠ SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRES
   REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY C



L RESISTANCES VALUES ARE IN Ω.
=1000Ω, MΩ=1000KΩ.
E WATTAGE OF RESISTORS IS 1/4W UNLESS OTHERWISE NOTED.
L CAPACITANCES VALUES ARE IN μF UNLESS OTHERWISE NOTED. P=μμF
. V : DC VOLTAGE AT NO SIGNAL
SAFETY-REQUIREMENTS COMPONENTS IN ACCORDANCE WITH PRESENT SAFETY
△ REGULATIONS, THESE COMPONENTS MUST ONLY BE REPLACED BY ORIGINAL PARTS.


PROTECTION CIRCUIT
POWER SUPPLY
TREBLE
BASS
SW509 treble turnover
SW510 tone defeat
SW511 bass turnover
German model
T1 POWER
F1 T3.15A 250V
SW1 POWER
P1 AC220/240V, 50/60Hz
220V
240V
SW2 VOLTAGE SELECTOR


-4.6V
Q2
2SA1115
(E)or(F)
R6
680K
-3.3V
R5
330K
R4
47K
R3
4.7K
D4
RD5.6EB2
R2
10K
C10
4.7/50V
R39
3.3K
D3
1S2471
R8
2.2M
R7
180K
C11
33/10
Q1
2SC2603
(E)or(F)
-0.5V
0V
R25
100K
C15
33P/500V
R26
47K
-44.0V
Q8
2SC1845
(E)or(F)
R18
22K
Q4
2SA1115
(E)or(F)
-0.6V
R13
47K
C12
0.33/50V
-4.7V
Q7
2SA1115
(E)or(F)
R14
22K
R15
22K
D5
1S2473
C13
0.33/50V
R16
47K
R17
10K
R51
390(1W)
D6
DS135E
D7
DS135E
D1:D5FB20F1
C6
4700/50V
C7
4700/50V
D1
C2
0.1
/250V
C3
0.1
/250V
T1
POWER
F1
6.3A 125V
SW1
POWER
C1
0.01 AC125V
P1
AC120V,
60Hz
SO3 SWITCHED
SO2
SO1
UNSWITCHED
R19
33
(FR)
R47
3.9K
C17
330/25V
C18
330/25V
R48
3.9K
R20
33
(FR)
D2:D5FB20F1
C8
4700
/50V
C9
4700
/50V
D2
C4
0.1
/250V
C5
0.1
/250V
Canada model
F2
5A 125V
F3
5A 125V
F4
5A 125V
F5
5A 125V
General model
T1
POWER
F1
T3.15A 250V
SW1
POWER
C1
0.01 AC250V
R1
3.3M (1/2W)
P1
AC220/240V,
50/60Hz
220V
240V
SW2
VOLTAGE
SELECTOR

WIRING DIAGRAM

PCB-1

IDLING CURRENT ADJ.(Lch)

IDLING CURRENT ADJ.(Rch)

DC BALANCE ADJ.(Lch)

DC BALANCE ADJ.(Rch)

TP1 TP2 TP3 TP4 TP5 TP6 TP7

German model
PCB-1

German model
PCB-10
LUG1

General and German models
PCB-5
CN1
PI AC220/240V, 50/60Hz
TI POWER
SW2 VOLTAGE SELECTOR

PCB-1 Canada model PCB-5
TI POWER
SW3 SW2 SW1
AC OUTLET
PI AC120V, 60Hz

SW401 speakers 1 / speakers 2 / 1+2 / off
PCB-8
RIGHT SPEAKER SYSTEM 1 LEFT
GND GND
TE401
GND GND
SPEAKER SYSTEM 2
RIGHT LEFT

PCB-11
J401 HEADPHONES

PCB-10
PRE-MAIN SEPARATE PRE-OUT
IN
J506 J507 J508 J509 TAPE 1
J510 J511 TAPE 2
OUT
J514 J513
J516 J515
MAIN-IN
R L

PCB-5
SW1 POWER
TI POWER
SW3 SW2 SW1
AC OUTLET
PI AC120V, 60Hz

SW601 cartridge MC ph.2 ⟷ MM ph.1
PCB-4
PHONO 1 (MM) J601 J602 L R
PHONO 2 (MC) J603 J604 L R
TUNER J501 J502 L R
VIDEO/CD J503 J504 L R

PCB-6
SW651 CAP. TRIM

PCB-7
VR504 VR503 VOLUME

German model
PCB-4
LUG2
PHONO 1 (MM) J601 J602 L R
PHONO 2 (MC) J603 J604 L R
TUNER J501 J502 L R
VIDEO/CD J503 J504 L R

PCB-2
SW501 FUNCTION
SW502 TAPE OUT
SW503 TAPE MONITOR
VR501 VR502 BALANCE
VR505 VR506 TREBLE
VR507 VR508 BASS

German model
PCB-2
LUG4
SW501 FUNCTION

POWER IND.
PCB-9

PCB-3
phono video/CD tuner tape 2 tape 1
SW504 mode
SW505 high cut
SW506 subsonic
SW507 bass contour
SW508 pre-out main-in integrated separate
SW509 treble turnover 2kHz 6kHz
SW510 tone defeat
SW511 bass turnover 400Hz 200Hz

German model
PCB-3
phono video/CD tuner
LUG3

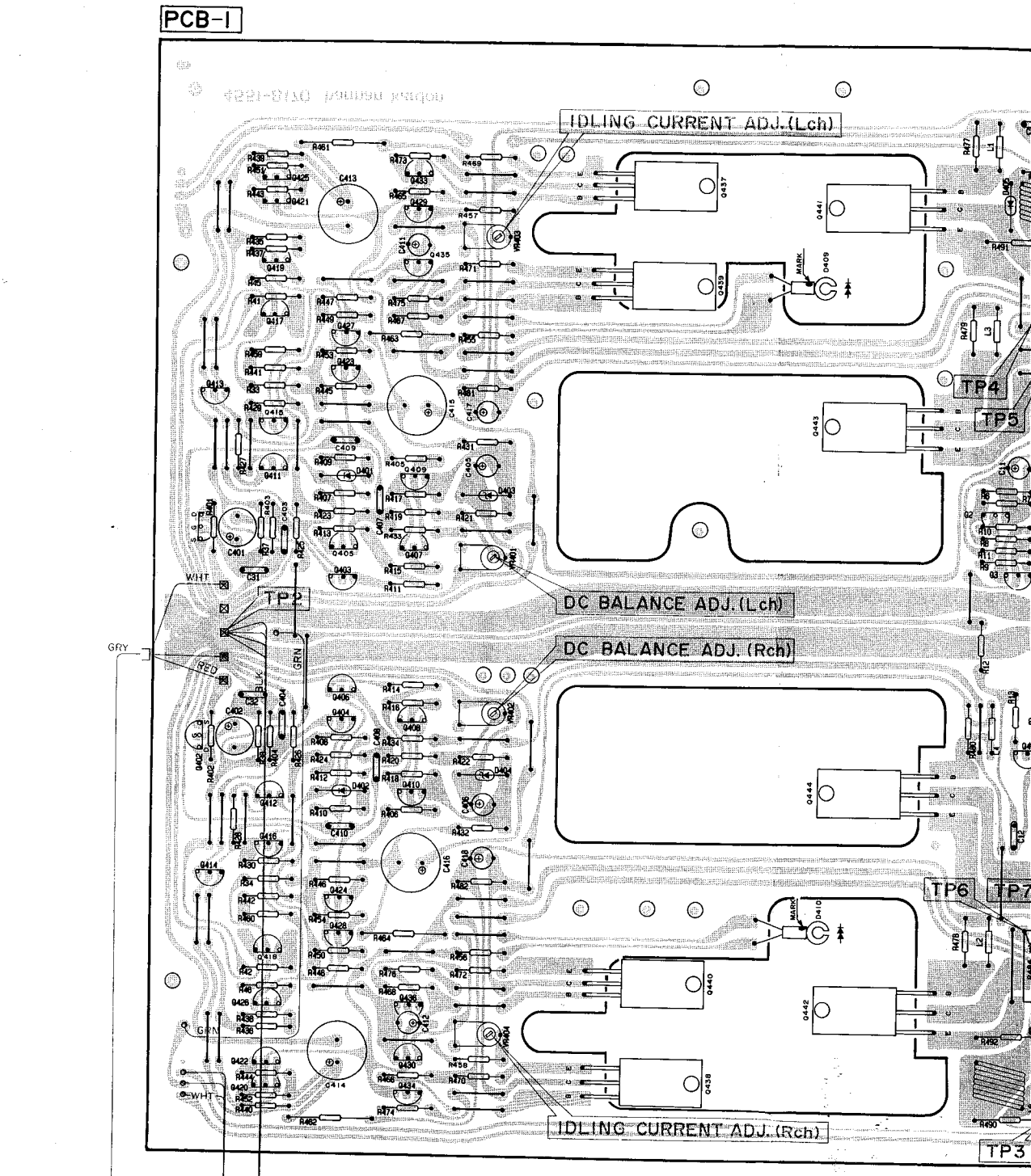
PIN CONNECTION DIAGRAM OF TRANSISTORS AND DIODES

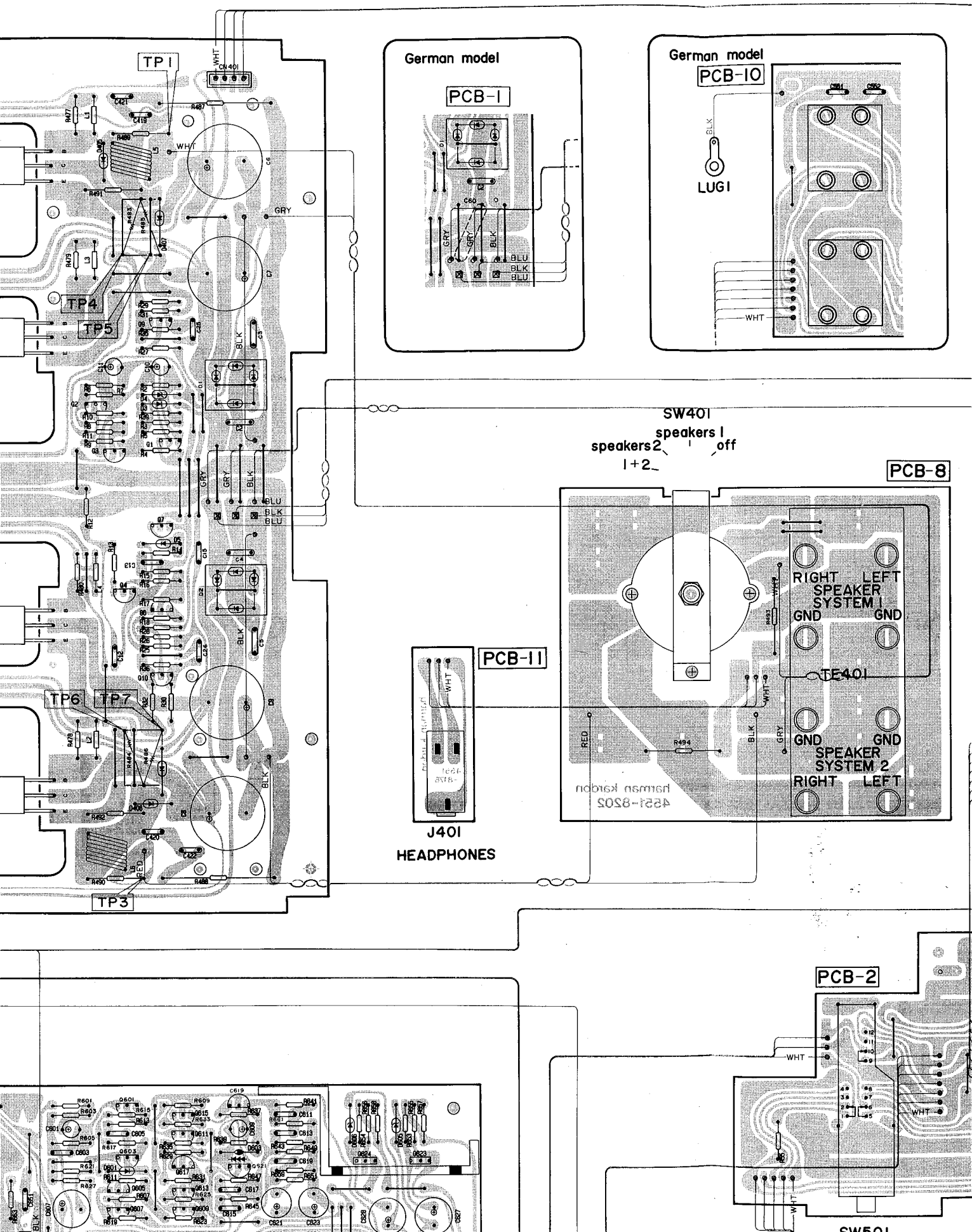
2SC1845 2SA970 2SC2240 2SA992 2SC945 2SC2320L 2SA999L 2SA1190 2SC2855	2SC2603 2SA1115	2SB646A 2SD666A 2SD667A 2SB647A 2SB647 2SD667 2SB646 2SD666	2SA1111 2SC2591	2SC3281 2SA1302	2SD669 2SB649	2SK373	2SK364	DS135E	1S2471 RD5.6EB2 1S2473 HZ15-1L 10DF2 HZ24-1L	MV12YM	GL5HD10	D5FB20F1	MV103

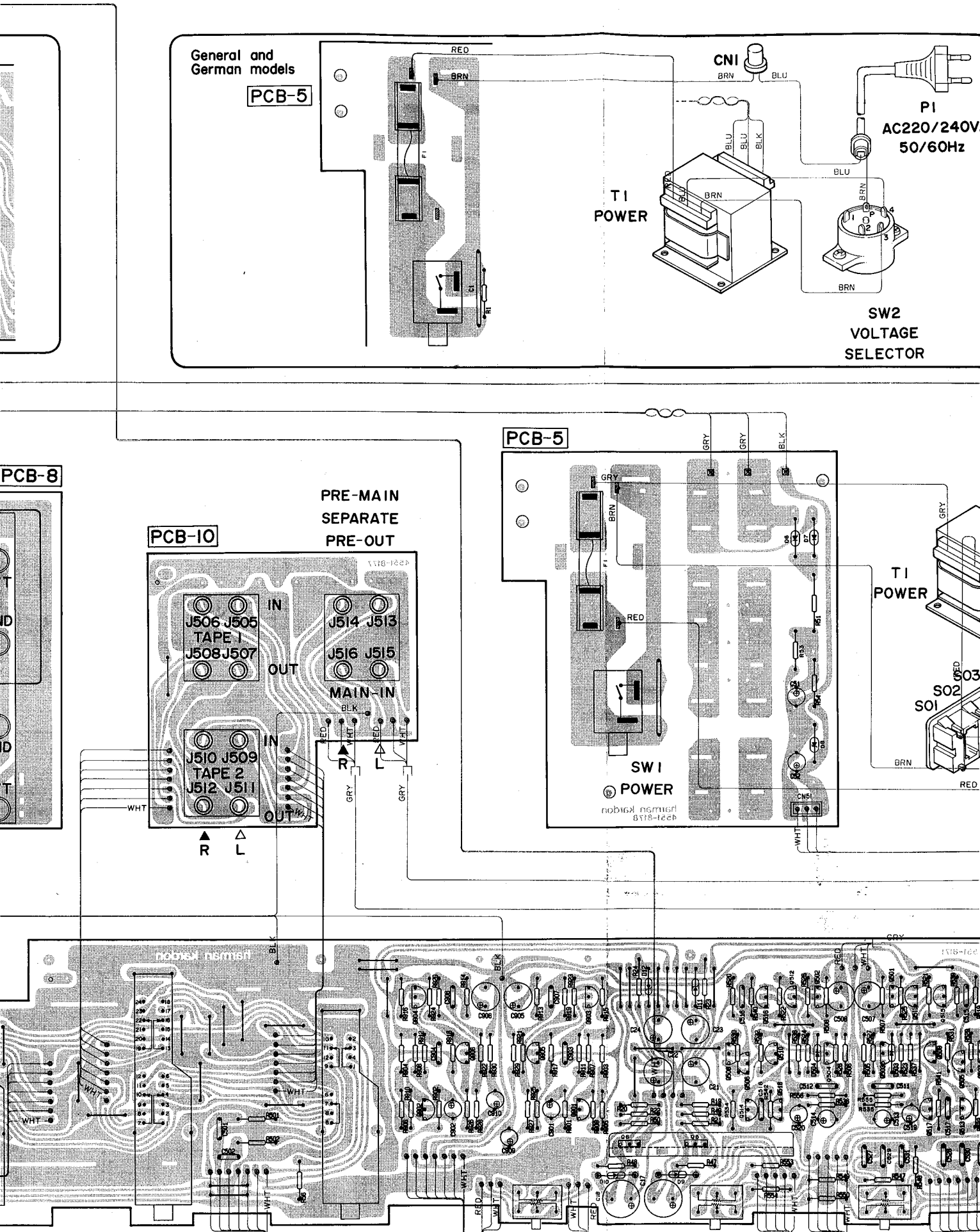
- WIRE COLOR ABBREVIATIONS
  - RED : Red
  - ORG : Orange
  - BLU : Blue
  - WHT : White
  - GRN : Green
  - BLK : Black
  - YEL : Yellow
  - PUP : Purple
  - PIK : Pink

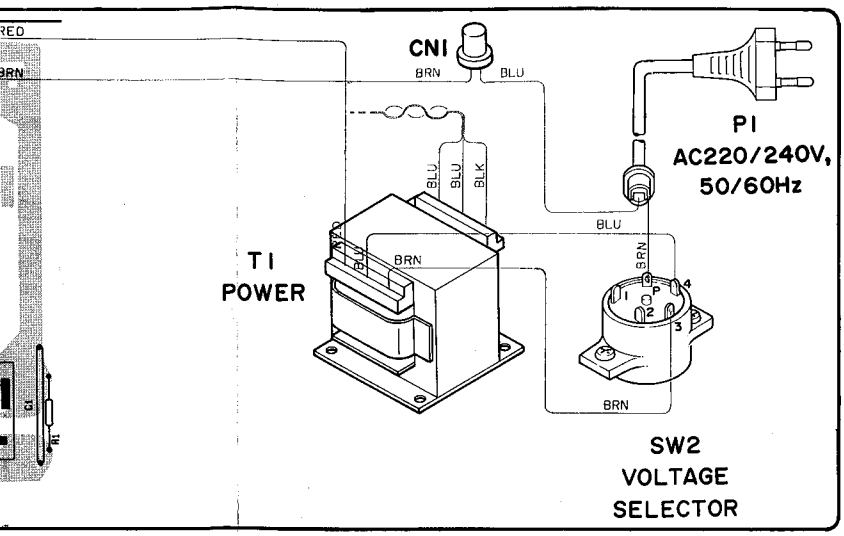
TRANSISTOR
Emitter Collector Base

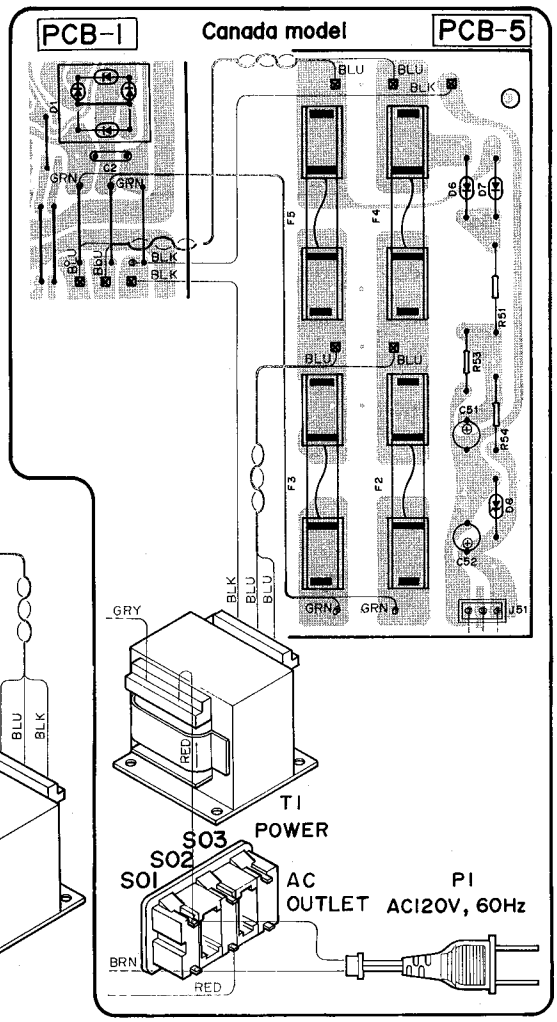
WIRING DIAGRAM

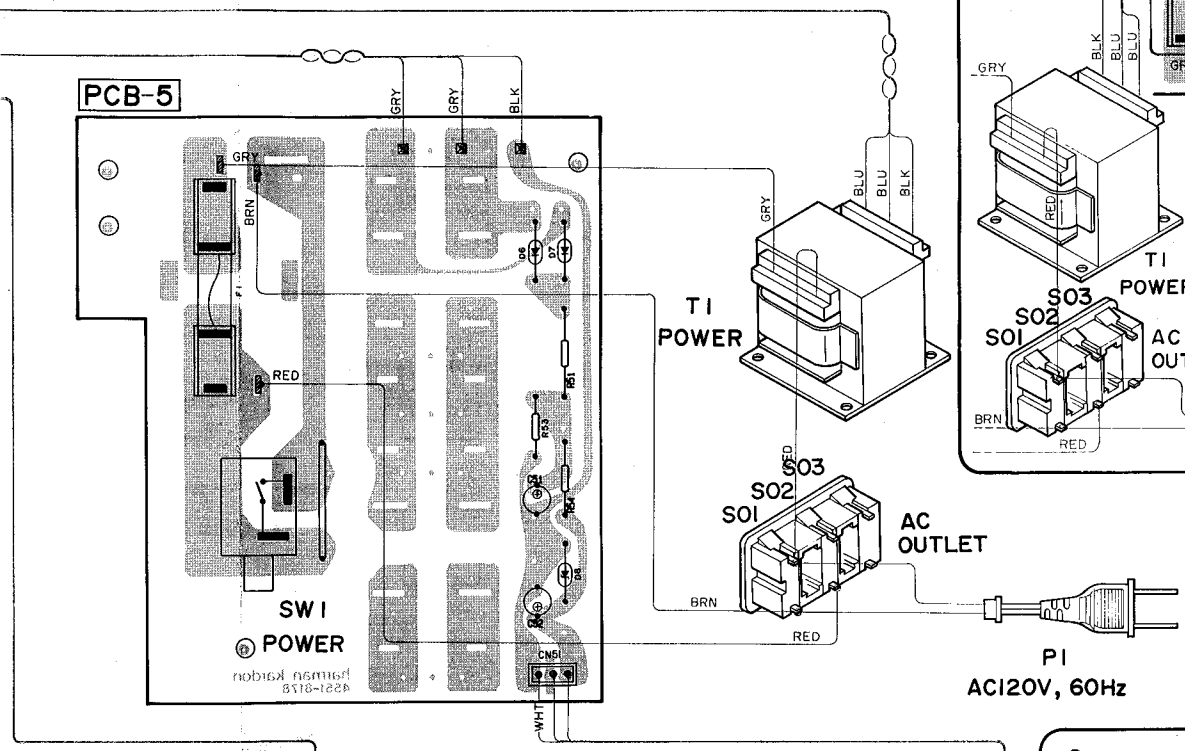


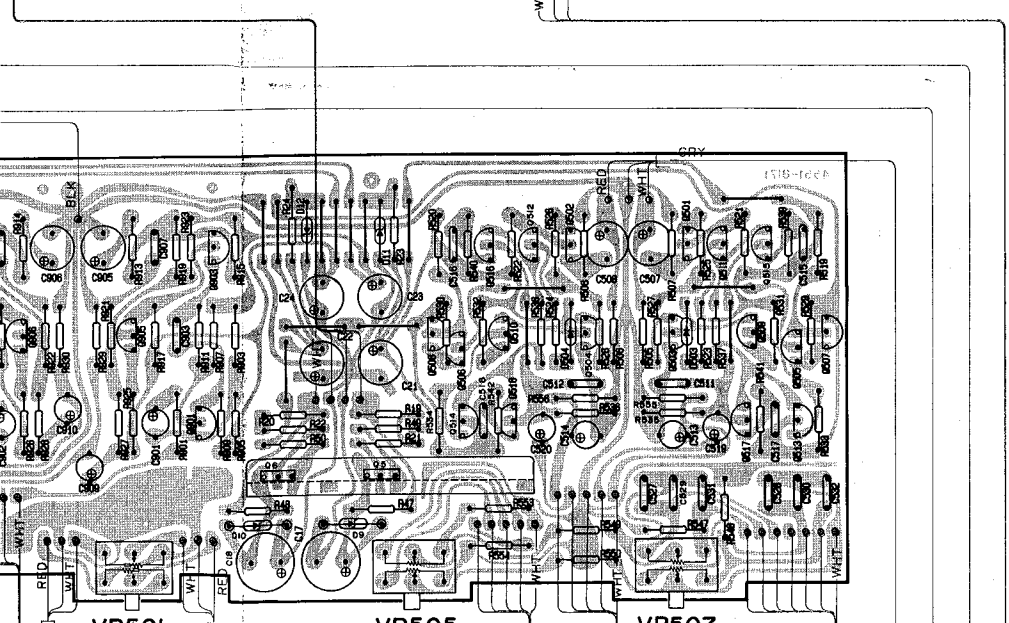

TP1
CN401
WHT
GRY
BLK
BLU
TP4
TP5
TP6
TP7
TP3
German model
PCB-1
German model
PCB-10
LUG1
SW401
speakers 1
speakers 2
off
1+2
PCB-8
RIGHT SPEAKER SYSTEM 1
LEFT
GND
TE401
GND SPEAKER SYSTEM 2
RIGHT
LEFT
PCB-11
J401
HEADPHONES
RED
PCB-2
SW501

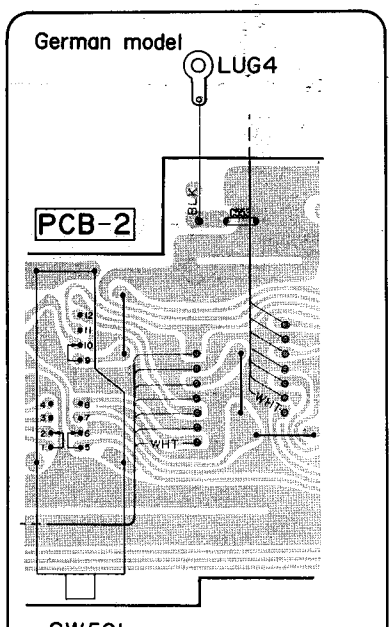

General and
German models
PCB-5
RED
BRN
F1
C1
R1
CN1
BRN
BLU
P1
AC220/240V
50/60Hz
BLU
BLU
BLK
BLU
BRN
T1
POWER
BRN
BRN
SW2
VOLTAGE
SELECTOR
PCB-8
PRE-MAIN
SEPARATE
PRE-OUT
PCB-10
IN
J506 J505
TAPE 1
J508 J507
OUT
J514 J513
J516 J515
MAIN-IN
BLK
RED
WHT
RED
WHT
R
L
IN
J510 J509
TAPE 2
J512 J511
OUT
WHT
GRY
GRY
R
L
PCB-5
GRY
GRY
BLK
GRY
BRN
F1
RED
D6
D7
R51
R54
R53
C43
C42
SW1
POWER
CN51
WHT
T1
POWER
GRY
SO3
SO2
SO1
BRN
RED
BLK
WHT
WHT
WHT
WHT
BLK
RED
WHT
GRY
WHT
RED
WHT
WHT
WHT
WHT

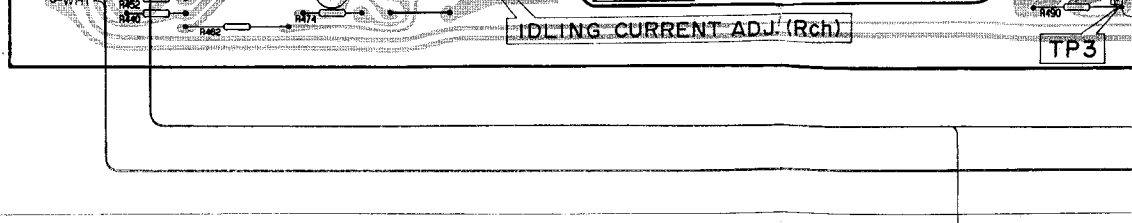

CN1
BRN
BLU
P1
AC220/240V,
50/60Hz
T1
POWER
SW2
VOLTAGE
SELECTOR


PCB-1
Canada model
PCB-5
T1
POWER
S03
S02
S01
AC
OUTLET
P1
AC120V, 60Hz


PCB-5
SW1
POWER
T1
POWER
S03
S02
S01
AC
OUTLET
P1
AC120V, 60Hz

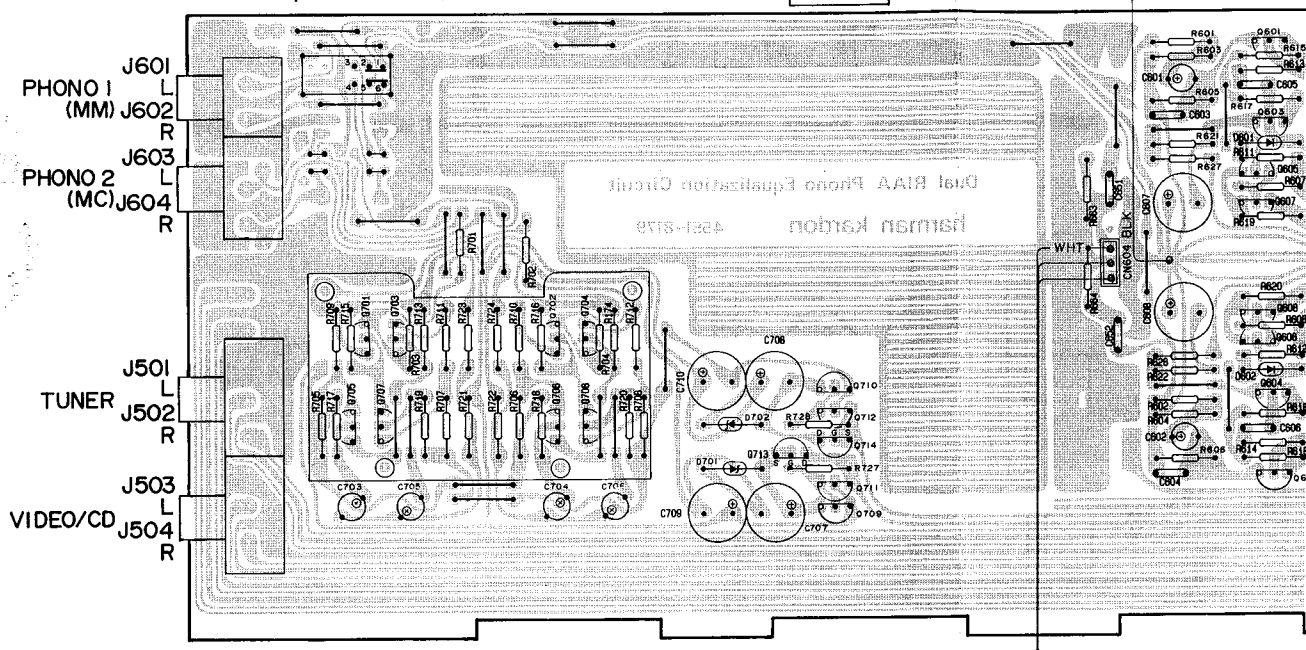



German model
LUG4
PCB-2

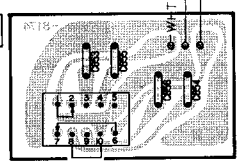


SW601
cartridge
MC ph.2 ←→ MM ph.1

PCB-4



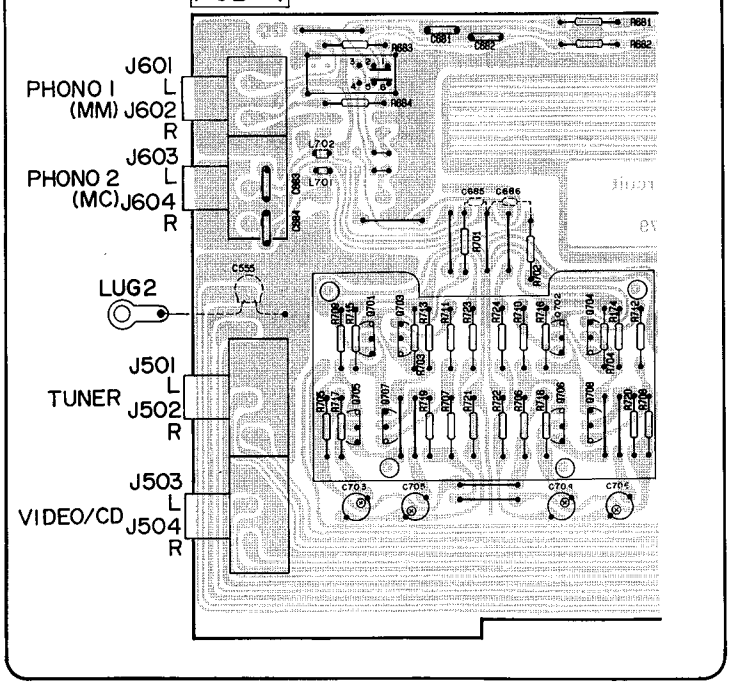
PCB-6



SW651
CAP. TRIM

German model

PCB-4



PIN CONNEC

2SC1845
2SA970
2SC2240
2SA992
2SC945
2SC2320L
2SA999L
2SA1190
2SC2855

NG CURRENT ADJ. (Rch)

TP3

PCB-4

PCB-6

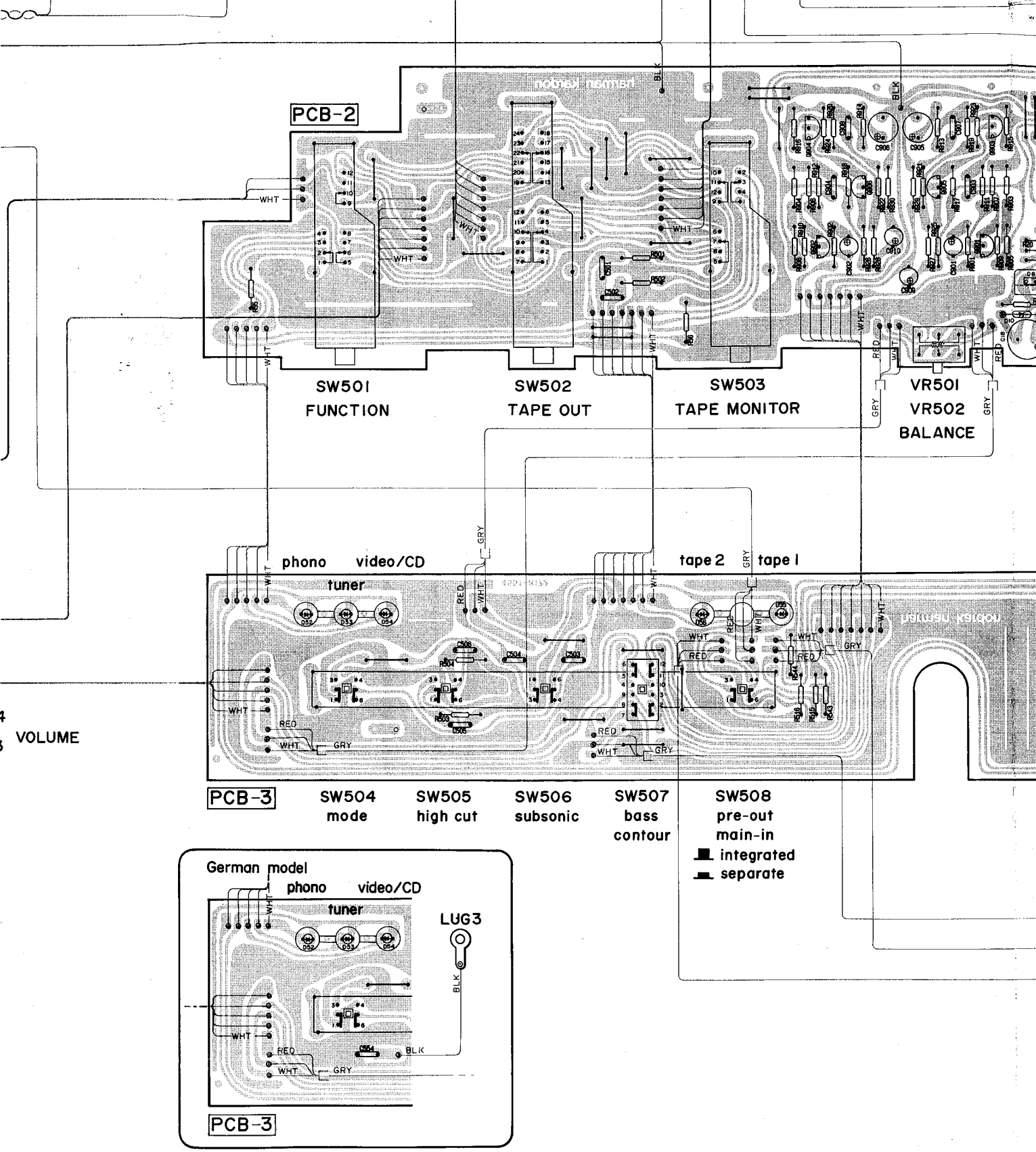
SW651
CAP. TRIM

PCB-7

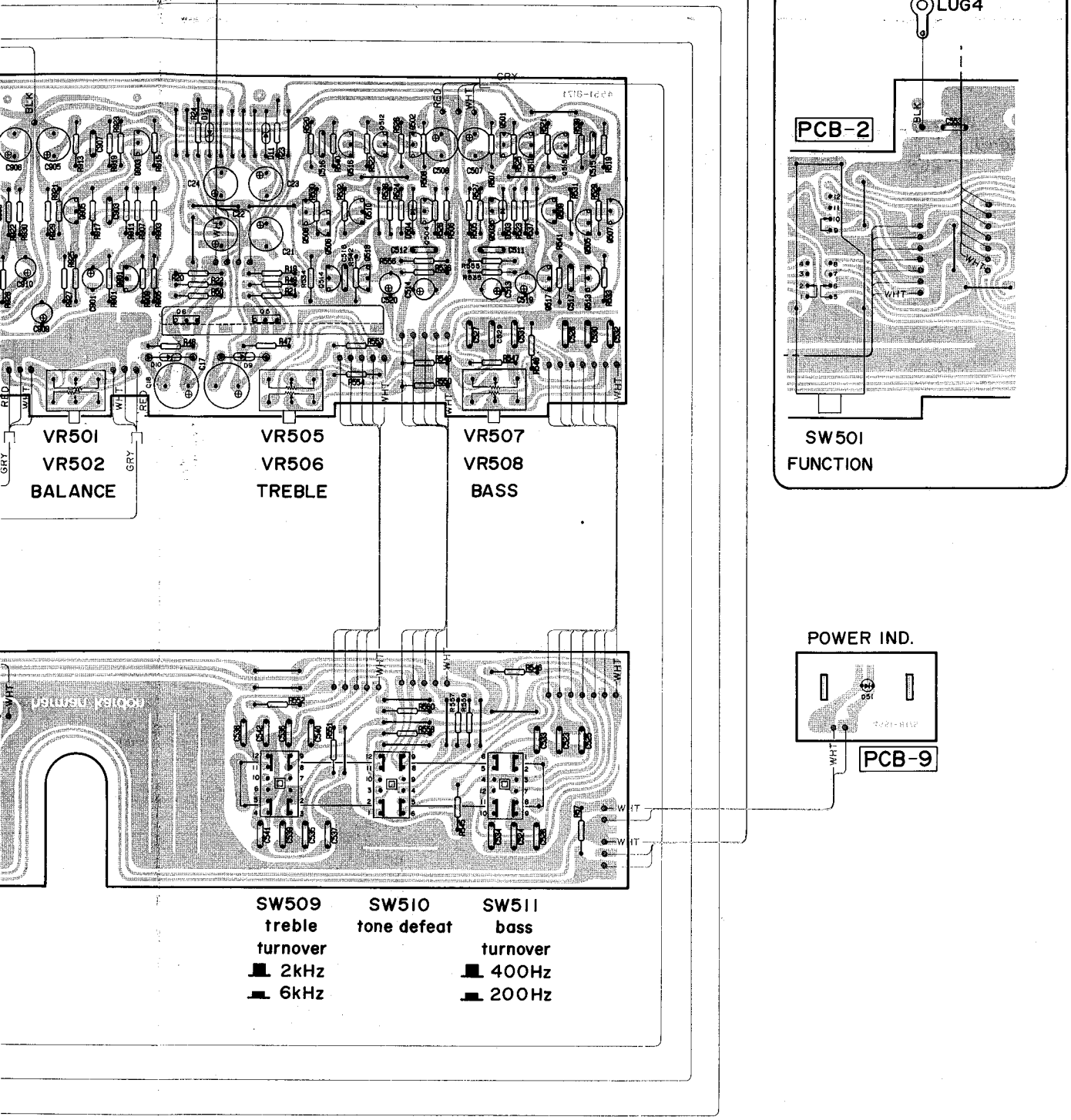
VR504
VR503 VOLUME

PIN CONNECTION DIAGRAM OF TRANSISTORS AND DIODES

2SC1845 2SA970 2SC2240 2SA992 2SC945 2SC2320L 2SA999L 2SA1190 2SC2855	2SC2603 2SA1115	2SB646A 2SD666A 2SD667A 2SB647A 2SB647 2SD667 2SB646 2SD666	2SA1111 2SC2591	2SC3281 2SA1302	2SD 2SB



1111 2591	2SC3281 2SA1302	2SD669 2SB649	2SK373	2SK364	DS135E	1S2471 RD5.6EB2 1S2473 HZ15-1L 10DF2 HZ24-1L	MV12YM	GL5HD10



12YM	GL5HD10	D5FB20F1	MV103
MARK	Cathode / Anode	~ ~ +	Anode / Cathode

- **WIRE COLOR ABBREVIATIONS**

RED	: Red
ORG	: Orange
BLU	: Blue
WHT	: White
GRN	: Green
BLK	: Black
YEL	: Yellow
PUP	: Purple
PIK	: Pink

TRANSISTOR

Emitter Collector Base